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Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

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Abstracts in *STAR* are grouped by specific category, the categories appearing in sequential order. Category breaks in the abstract section are identified by the category number and title, and a scope note. Cross-references to other categories are provided as appropriate. For example:

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For related information see also *34 Fluid Mechanics and Heat Transfer*.

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For related information see also *34 Fluid Mechanics and Heat Transfer*

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Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) **N.A.**

89 ASTRONOMY **3228**
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS **3228**
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION **3230**
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

92 SOLAR PHYSICS **3230**
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION **3231**
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

GENERAL

99 GENERAL **N.A.**

Note: N.A. means that no abstracts were assigned to this category for this issue.

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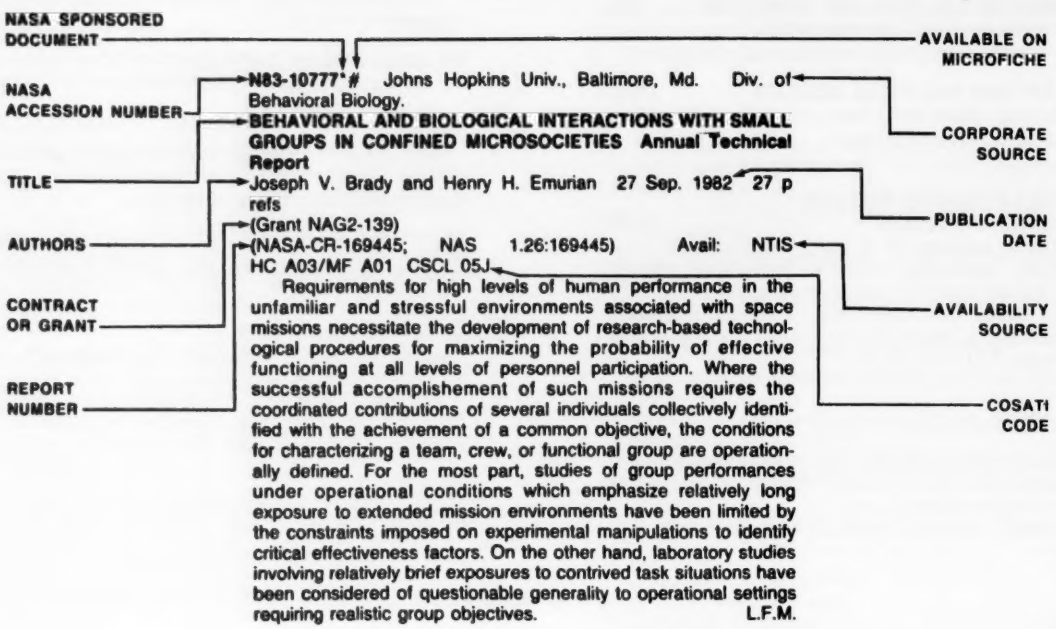
TYPICAL CITATION AND ABSTRACT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N83-10777* # Johns Hopkins Univ., Baltimore, Md. Div. of Behavioral Biology.
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TITLE
BEHAVIORAL AND BIOLOGICAL INTERACTIONS WITH SMALL GROUPS IN CONFINED MICROSOCIETIES Annual Technical Report
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(NASA-CR-169445; NAS 1.26:169445) Avail: NTIS HC A03/MF A01 CSCL 05J
COSATI CODE
Requirements for high levels of human performance in the unfamiliar and stressful environments associated with space missions necessitate the development of research-based technological procedures for maximizing the probability of effective functioning at all levels of personnel participation. Where the successful accomplishement of such missions requires the coordinated contributions of several individuals collectively identified with the achievement of a common objective, the conditions for characterizing a team, crew, or functional group are operationally defined. For the most part, studies of group performances under operational conditions which emphasize relatively long exposure to extended mission environments have been limited by the constraints imposed on experimental manipulations to identify critical effectiveness factors. On the other hand, laboratory studies involving relatively brief exposures to contrived task situations have been considered of questionable generality to operational settings requiring realistic group objectives. L.F.M.

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Scientific and Technical Aerospace Reports

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01 AERONAUTICS (GENERAL)

N83-30354* National Aeronautics and Space Administration, Washington, D. C.
AERONAUTICAL ENGINEERING: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 163
Jul. 1983 113 p
(NASA-SP-7037(163); NAS 1.21:7037(163)) Avail: NTIS HC $5.00 CSCL 01A

The bibliography lists 387 reports, articles and other documents introduced into the NASA scientific and technical information system in June 1983. Author

N83-30355# General Accounting Office, Washington, D. C. Procurement, Logistics and Readiness Div.
SAVINGS CAN BE MADE BY USING COMPRESSED AIR WHEN TESTING AIRCRAFT FOR FUEL LEAKS (GAO/PLRD-83-69)
22 Apr. 1983 4 p refs
(B-207202) Avail: NTIS HC A02/MF A01

The use of compressed air to test F-4 aircraft for fuel leaks is evaluated. Author

N83-30356# Naval Postgraduate School, Monterey, Calif.
ECONOMIC EFFECTS OF NOISE ABATEMENT REGULATIONS ON THE HELICOPTER INDUSTRY M.S. Thesis
Alexander Nicholson Conner Dec. 1982 66 p refs
(AD-A127331) Avail: NTIS HC A04/MF A01 CSCL 01/3

This thesis discusses the economic effects of noise abatement regulations on the helicopter industry. Increased manufacturing and operating costs from noise abatement regulations on Sikorsky's S-76 helicopter are estimated. The effects on consumer utilization are also discussed. An appendix compares to independent research studies that used weight estimating relationships and cost estimating relationships to estimate manufacturing costs of the helicopter by subsystem. This thesis proposes that if noise abatement for future technological improvements, helicopter manufacturers, operators of helicopter business, and consumers of helicopter services would be adversely affected. GRA

N83-30357# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
GROUND/FLIGHT TEST TECHNIQUES AND CORRELATION
Feb. 1983 535 p refs In ENGLISH; partly in FRENCH Symp. held at Cesme, Turkey, 11-14 Oct. 1982
(AGARD-CP-339; ISBN-92-835-0328-7) Avail: NTIS HC A23/MF A01

Large advances in wind tunnel and flight test instrumentation and data processing have provided better confidence in the data and, consequently, improved comparison bases. Even larger advances were made in computational aerodynamics and this has provided the basis for an efficient design tool for transport aircraft. However, in spite of all these improvements there is still a problem in providing accurate and satisfactory performance predictions. Concern was also expressed that with the increasing sophistication of test and prediction techniques, engineers may lose "track" of the physics of prediction and comparison. For individual titles, see N83-30358 through N83-30384.

N83-30358# Office National d'Etudes et de Recherches Aeronautiques, Paris (France).
PROGRESS IN WIND TUNNEL TEST TECHNIQUES AND IN THE CORRECTIONS AND ANALYSIS OF THE RESULTS c02
T. W. Binion, Jr. (AEDC), X. Vaucheret, and X. Bouis *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 31 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

In response to the increased complexity and cost testing, wind tunnel operators are doing many things to improve test effectiveness. Several recent innovations designed to increase the amount of information obtained during a test, to reduce information unit cost, and to improve data quality are described. Author

N83-30359# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
AEROTHERMODYNAMIC FLIGHT ENVELOPE EXPANSION FOR A MANNED LIFTING REENTRY VEHICLE (SPACE SHUTTLE) c16
J. K. Hodge, D. R. Audley, P. W. Phillips (AFFTC), and E. K. Hertzler (AFFTC) *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 12 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

A systematic approach of integrating the best of ground tests, flight simulators, and flight tests was developed and used for aerothermodynamic flight envelope expansion for the Space Shuttle Orbiter. Equations and parameters were selected which were appropriate for the flight simulator at the Air Force Flight Test Center (AFFTC) and also for the reduction of flight data from imbedded thermocouples. Transient flight test maneuvers were designed using the simulator and suggested to the National Aeronautics and Space Administration (NASA) at the Johnson Space Center. Parameters were estimated from flight thermocouple data during the maneuvers by a new data reduction technique. The parameters were compared with simulator parameters which were based on ground test data and theory. The objective, however, was envelop expansion and not data comparison. Simulator parameters were appropriately and quickly updated before the next flight test. The new flight data reduction technique is also valuable in analyzing wind tunnel thermocouple data to reduce test time. Author

N83-30360# Air Force Flight Test Center, Edwards AFB, Calif.
PREDICTED AND FLIGHT TEST RESULTS OF THE PERFORMANCE AND STABILITY AND CONTROL OF THE SPACE SHUTTLE FROM REENTRY TO LANDING c16
Paul W. Kirsten and David F. Richardson *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 23 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

Aerodynamic performance and stability data obtained from the

first three reentries of the Space Shuttle Orbiter is presented. Flight results are compared to predicted data from Mach 25 to Mach 0.4. Differences between flight and predicted data as well as probable causes for the discrepancies are given. Comparisons between simulator and flight results are also presented. Author

N83-30361# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
GROUND/FLIGHT CORRELATION ON THE ALPHA-JET EXPERIMENTAL AIRCRAFT WITH A TRANSONIC WING: A COMPARISON BETWEEN WIND TUNNEL AND FLIGHT RESULTS FOR AERODYNAMIC PERFORMANCE c05
D. Jacob, D. Welte, and H. Wonnenberg *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 14 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

Wind tunnel and flight results obtained in an experimental program with a transonic wing (TST) on an Alpha-Jet as test vehicle are compared. The comparison is concentrated on lift, drag and buffet data. In addition to the analysis of round and flight data for the TST flight data for the transonic wing and the standard wing are briefly compared. Author

N83-30362# Office National d'Etudes et de Recherches Aeronautiques, Paris (France).
GROUND/FLIGHT CORRELATION ON THE ALPHA-JET EXPERIMENTAL AIRCRAFT WITH A TRANSONIC WING: A COMPARISON OF THE WING PRESSURE DISTRIBUTION AND LOCAL WAKE SURVEY FROM ANALYTICAL, WIND TUNNEL AND FLIGHT RESULTS c05
H. Buers (Dornier G.m.b.H.), V. Schmitt, and J. Lerat *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 20 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

Pressure Distributions at four sections of a transonic wing on a combat aircraft have been measured in different wind tunnels and in flight. The results are compared with each other and with theoretical data. In addition, wind tunnel and flight test wake results obtained from a rotating pitot-tube are presented. Author

N83-30363# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FLIGHT AND WIND-TUNNEL CORRELATION OF BOUNDARY-LAYER TRANSITION ON THE AEDC TRANSITION CONE c02
David F. Fisher and N. Sam Dougherty, Jr. (Rockwell International) *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 25 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

Transition and fluctuating surface pressure data were acquired on a 10 degree included angle cone, using the same instrumentation and technique over a wide range of Mach and Reynolds numbers in 23 wind tunnels and in flight. Transition was detected with a traversing pitot pressure probe in contact with the surface. The surface pressure fluctuations were measured with microphones set flush in the cone surface. Good correlation of end of transition Reynolds number Re (sub T) was obtained between data from the lower disturbance wind tunnels and flight up to a boundary layer edge Mach number, M (sub e) = 1.2. Above M (sub e) = 1.2, however, this correlation deteriorates, with the flight Re (sub T) being 25 to 30% higher than the wind tunnel Re (sub T) at M (sub e) = 1.6. The end of transition Reynolds number correlated within + or - 20% with the surface pressure fluctuations. Broad peaks in the power spectral density distributions indicated that Tollmien-Schlichting waves were the probable cause of transition in flight and in some of the wind tunnels. Author

N83-30364# Vereinigte Flugtechnische Werke-Fokker G.m.b.H., Bremen (West Germany).
EXPERIMENTAL INVESTIGATIONS OF TRANSPORT AIRCRAFT LOW SPEED ENGINE INTERFERENCE EFFECTS AND FLIGHT TEST CORRELATION c05
B. Ewald and W. Burgsmueller *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 15 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

Engine airframe interference effects for wing mounted engine in transport aircraft development and flight testing were examined. The tendency to reduced engine numbers results in a large effect of the one engine out second segment climb on overall aircraft economy. Large development efforts are worthwhile to realize even small drag reductions in this condition. The most perfect engine simulator available, the turbine powered simulator (TPS), was used in the high speed regime only. The concept of low speed TPS testing was developed. The TPS is proven to be a reliable and valuable experimental tool also in low speed range, provided that sophisticated data acquisition and evaluation techniques are used for optimum accuracy and repeatability. Operating equipment and test methods are improved. Results and experience are described. E.A.K.

N83-30365# Canadair Ltd., Montreal (Quebec).
COMPARISON OF PREDICTION, WIND TUNNEL AND FLIGHT TEST DATA FOR THE CANADAIR CHALLENGER TURBOFAN AIRCRAFT c05
Fotis Mavriplis *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 14 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

Theoretical aerodynamic methods, wind tunnel test and flight test for the Challenger aircraft which features an advanced supercritical wing, a wide body and large aft mounted nacelles were presented. These results represent one of first applications of Jameson's isolated wing full potential flow transonic method to advanced wing design for an aircraft which is now in service. The techniques used to obtain wind tunnel force and pressure distribution data at high speed and CLmax data at low speed are described. A flight wing pressure survey which provided data for comparison with wind tunnel test results is described. Correlations of pressure distributions between theory and wind tunnel test indicate the capabilities and limitations of the isolated wing transonic code. Wing pressure and spanwise load distributions from flight test correlate well with corresponding data from wind tunnel tests. Flight test results on CLmax and buffet onset boundary correlate also well with predictions based on wind tunnel data. Reynolds Number and transition fixing for wind tunnel testing of supercritical wings to obtain good correlation with flight test are recommended. E.A.K.

N83-30366# British Aerospace Aircraft Group, Warton (England).
LESSONS FROM TORNADO AFTERBODY DEVELOPMENT c05
D. C. Leyland *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 15 p (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

The wind tunnel model test program for the Tornado aircraft design included the development of a new afterbody test rig, which showed the benefit of measuring airframe axial force separately from nozzle and allowed detailed configuration for minimum drag. Flight tests showed good agreement with drag prediction but handling characteristics under certain conditions were different from predictions derived from full model tests, as a consequence of relatively minor differences in afterbody representation. Flight and model investigations led to satisfactory configuration and to requirements for future model test programs. Flight and model test data were compared by arranging additional afterbody model tests of geometric changes made during the flight program. There was good agreement between results and, conclusions for the requirements for future model and flight testing. The introduction of high frequency response pressure instrumentation is proposed. E.A.K.

N83-30367# Avions Marcel Dassault, Saint-Cloud (France). Dept. Dynamique du Vol.
THE HIGH ANGLE OF ATTACK BEHAVIOR OF A COMBAT AIRCRAFT: CORRELATION BETWEEN PREDICTION AND FLIGHT [COMPORTEMENT A GRANDE INCIDENCE D'UN

AVION DE COMBAT: CORRELATION ENTRE LES PREVISIONS ET LE VOL] c05

Paul-Louis Mathe *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 8 p In FRENCH (For primary document see N83-30357 19-01)

Avail: NTIS HC A23/MF A01

The Mirage 2000 aircraft is equipped with an entirely electronic flight control system. The aircraft is automatically protected from eventual loss of control by a flight control function which assures an automatic limitation of the angle of the aircraft to a value dependent on flight conditions; and by careful adaptation of the command and control functions of the aircraft's axes of roll and loop. This adaptation minimizes the slipping introduced by maneuvers at high angle of attack. The automatic limitation of the incidence and rigorous control of the transverse axes are keys to the protection of the aircraft against loss of control.

Transl. by E.A.K.

N83-30368# Royal Aircraft Establishment, Farnborough (England). Aerodynamics Dept.

THE USE OF FREE-FLIGHT MODELS FOR THE PREDICTION OF DEPARTURE CONTROL c04

G. F. Moss, A. Jean Ross, Geraldine F. Edwards, and E. B. Jefferies *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 17 p refs (For primary document see N83-30357 19-01)

Avail: NTIS HC A23/MF A01

The importance of prediction techniques for the flight-dynamic behavior of proposed aircraft projects and in particular the use of the free flight model technique are discussed. Such free flight models are able to carry onboard flight control systems and can be used to evaluate stability augmentation and departure prevention methods. Examples of flight records of free flight tests are presented and compared with theoretical predictions and corresponding full scale data. A research program using HIRM, a high incidence research model configuration, is described which has as its central objective the widening of understanding of the flight dynamics phenomena of combat aircraft at high angles of attack. E.A.K.

N83-30369# Saab-Scania, Linkoping (Sweden).

COMPARISON OF FLIGHT AND WIND TUNNEL BUFFETING MEASUREMENTS ON THE SAAB 105 AIRCRAFT c05

S. H. Teige, B. S. A. Nilsson, S. J. Boersen (NLR), and A. N. Kraan (NLR) *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 10 p refs (For primary document see N83-30357 19-01)

Avail: NTIS HC A23/MF A01

Buffet tests on a Saab 105 aircraft which were carried out in flight at high speed and wind tunnel measurements on a half model were performed at the same Mach numbers and almost the same Reynolds number are discussed. Buffet levels were derived from wind tunnel accelerometer signals using Jones' method. It is concluded that with careful testing, this method may be used to predict flight buffet loads from wind tunnel measurements. E.A.K.

N83-30370# Royal Aircraft Establishment, Bedford (England). Aerodynamics Dept.

SOME MEASUREMENTS OF BUFFETING ON A FLUTTER MODEL OF A TYPICAL STRIKE AIRCRAFT c08

D. G. Mabey and B. E. Cripps *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 16 p refs (For primary document see N83-30357 19-01)

Avail: NTIS HC A23/MF A01

Some buffeting measurements on a flutter model of the wing of a typical strike aircraft are described and the results are compared with flight experiments. New criteria for light, moderate and severe levels of buffeting are proposed, to supplement previously derived empirical criteria. The results confirm that buffet penetration in flight is not limited by the severity of buffeting, but by handling limits. The wing of this model has a rigid body freedom in the low frequency roll mode, which clearly indicates wing-rock after buffet onset. Measurements of the response in this mode indicated that the buffet excitation was bounded, and comparable with that in the first symmetric bending mode, even when the aerodynamic damping in the roll mode was falling rapidly. The rapid fall, after buffet onset, of the aerodynamic damping in this low frequency rigid body mode was accurately predicted from steady pressure measurements. In marked contrast the measured increase, after buffet onset, of the aerodynamic damping for the first symmetric bending mode could not predicted from steady pressure measurements. These observations have important implications for the prediction of buffeting in flight from measurements on models. M.G.

N83-30371# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.

AERODYNAMIC MODEL IDENTIFICATION FROM DYNAMIC FLIGHT TEST DATA AND WIND TUNNEL EXPERIMENTS c05

J. A. Mulder, J. G. denHollander, and H. Binkhorst *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 21 p refs (For primary document see N83-30357 19-01)

Avail: NTIS HC A23/MF A01

Dynamic flight test techniques may be employed for the measurement of a variety of aircraft performance characteristics as well as for the measurement of stability and control characteristics in the form of for instance classical Stability and Control derivatives. The development of nonlinear aerodynamic models from dynamic flight test data is addressed. Several closely related characteristics of these models are discussed in detail such as goodness of fit to flight test data, the accuracy of model predictions and model complexity. Results are presented of a flight test program with the DHC-2 Beaver experimental aircraft equipped with a high accuracy instrumentation system. Different aerodynamic models are compared with results from windtunnel experiments. Author

N83-30372*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

HELICOPTER SIMULATION VALIDATION USING FLIGHT DATA c09

David L. Key (Army Research and Technology Labs.), Raymond S. Hansen (Army Research and Technology Labs.), William B. Cleveland, and William Y. Abbott (Army Aviation Engineering Flight Activity) *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 13 p refs (For primary document see N83-30357 19-01)

Avail: NTIS HC A23/MF A01 CSCL 14B

See N83-13112. Author (IAA)

N83-30373# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).

CORRELATION ASPECTS OF ANALYTICAL, WIND TUNNEL AND FLIGHT TEST RESULTS FOR A HINGELESS ROTOR HELICOPTER c05

J. Kaletka and H.-J. Langer *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 16 p refs (For primary document see N83-30357 19-01)

Avail: NTIS HC A23/MF A01

Two approaches to develop and verify mathematical descriptions of rotorcraft characteristics are discussed: (1) wind tunnel experiments with a model rotor, and (2) parameter identification from flight test data. A rotor test stand with a Mach scaled BO 105 model rotor was used for measurements in two different large wind tunnels. After addressing rotor scaling aspects, emphasis is placed on wind tunnel influences and their corrections to provide the transferability of the results to the full-scale rotor. Specific tests to determine flight mechanical static derivatives are described. BO 105 flight test data were used for the identification of mathematical models describing the dynamic behavior of the helicopter. After an introduction to system identification, the system excitation problem and the verification of results are addressed. Examples showing both identified derivatives and time histories of the helicopter and identified model responses are given. Finally, derivatives extracted from wind tunnel and flight tests are

discussed. For comparison theoretically calculated values are also presented. M.G.

N83-30374# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. fuer Flugmechanik.

CORRELATION ASPECTS IN THE IDENTIFICATION OF DYNAMIC EFFECTS USING COMPLEMENTARY TECHNIQUES FLIGHT IN TURBULENCE: GUST ALLEVIATION c08

K. Welhelm and R. Verbrugge (Inst. de Mecanique des Fluides) *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 22 p refs (For primary document see N83-30357 19-01)

Avail: NTIS HC A23/MF A01

An overview of a research program underway at DFVLR-Braunschweig (FRG) and IMF-Lille (France) is presented. The goals of this program are (1) the comparison of complementary techniques by correlating their results, and (2) the modeling of aerodynamic transient effects which must be considered for aircraft flying in turbulence situations in connection with a gust alleviation system. The following techniques are applied in the program: theoretical prediction, static wind tunnel measurements, forced oscillation balance measurements, semi-free flight model tests (dynamic simulation in wind tunnel), catapult free-flight model tests, full-scale flight tests and system identification methods. A brief description of the different facilities is given, advantages and special problems associated with the application of the different test techniques are shown. Test results are presented and compared. Two alternate approaches for modeling aerodynamic transient effects are presented. The influence of the modeling of these effects on the efficiency of an open-loop gust alleviation system is shown. Author

N83-30375# Institut de Mecanique des Fluides de Lille (France).

ASPECTS OF CORRELATION IN THE IDENTIFICATION OF DYNAMIC EFFECTS FROM COMPLIMENTARY TECHNIQUES: EVOLUTION AT HIGH ANGLES [ASPECTS DE LA CORRELATION DANS L'IDENTIFICATION D'EFFECTS DYNAMIQUES A PARTIR DE TECHNIQUES COMPLEMENTAIRES EVOLUTION AUX GRANDS ANGLES] c08

D. Tristrant *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 21 p refs In FRENCH; ENGLISH summary (For primary document see N83-30357 19-01)

Avail: NTIS HC A23/MF A01

Some experimental and analytical methods which contribute to the comprehension and prediction of aircraft behavior at high angles of attack and stall/spin are presented. A combat aircraft can start a spin departure around an horizontal trajectory which becomes vertical after several spin turns. The comparison between such a spin and that observed in vertical wind tunnel on free flight model is not easy, particularly if these movements are agitated. A representation of high angle motions, visually giving the principal characteristics of the phenomena independently of the trajectory is suggested. Such a repesentation allows the correlation of spin motions between the vertical wind tunnel and the full scale flight. One of the basic parameters which could modify the quality of the correlation of spin tests realized in Froud similitude is the Reynolds number. With a typical example concerning a light aircraft, the important influence of Reynolds number on spin equilibrium state and the test method which allows one to understand and correlate the phenomena are shown. With a typical example concerning a combat aircraft, some measurement results on a dynamic balance are examined which allow the evaluation of the aerodynamic force system at high angle of attack, the modeling of aerodynamic effects and then spin simulations which can be compared with vertical wind tunnel results on free flight model. Author

N83-30376# Army Aviation Research and Development Command, Moffett Field, Calif. Aeromechanics Lab.

DYNAMIC STRUCTURAL AEROELASTIC STABILITY TESTING OF THE XV-15 TILT ROTOR RESEARCH AIRCRAFT c08

L. G. Schroers *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 18 p refs (For primary document see N83-30357 19-01)

Avail: NTIS HC A23/MF A01

Predicted aeroelastic characteristics are examined in light of the major parameters effecting rotor-pylon-wing stability. Flight test techniques used to obtain XV-15 aeroelastic stability are described. The flight test results are summarized and compared to the predicted values. In addition, a limited comparison of wind tunnel results, flight test results, and their correlation with predicted values is presented. M.G.

N83-30377# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Military Aircraft Div.

GROUND AND FLIGHT TEST TECHNIQUES USED FOR PROOF OF STRUCTURAL INTEGRITY OF THE TORNADO COMBAT AIRCRAFT c05

Karl Knauer and O. Sensburg *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 48 p refs (For primary document see N83-30357 19-01)

Avail: NTIS HC A23/MF A01

A short description of the Tornado program is given. The complex requirements for this all-weather combat aircraft resulted in an optimal concept including features like highly loaded swing wing in combination with a sophisticated high lift system; fly-by-wire and automatic terrain following; supersonic inlet; ant two three spool engines with integrated thrust reverser. To accommodate all the mentioned features in a minimum size/weight aircraft, it is necessary to give special attention to the structural aspects. A description of some typical examples for structural certification is presented: load and flutter models; structural component tests; design verification tests, especially for the wing suspension and pivot system; proof and ultimate load testing; and fatigue life assessment. Comparisons of selected predictions with ground and flight test results are presented for the important structural disciplines: stresses and deflections of important components; loads; and aeroelastics. Some examples of bad correlation between theory and test are discussed together with possible explanations. The merits and disadvantages of the most important theoretical methods are highlighted. R.J.F.

N83-30378# British Aerospace Aircraft Group, Warton (England). Aircraft Group.

COMPARISON OF FLIGHT LOADS MEASUREMENTS RESULTS AND PREDICTION FOR TORNADO c05

J. R. J. Dovey and G. Moretti *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 19 p refs (For primary document see N83-30357 19-01)

Avail: NTIS HC A23/MF A01

An extensive program of flight loads measurements was made on Tornado MARCA aircraft to contribute to service clearance as required by the American Military specifications. A brief resume is presented of the purpose of flight load measurements, the overall program, the calibration of the load measurement devices, the data reduction facilities, the flying techniques and of the methods used for detailed analysis of the results. Comparisons are made between flight measurements and predictions for several aircraft components for specific maneuvers and for rates of change of load with change of aircraft parameters. The contribution of flight load measurements to the extension of the flight envelope in rapid roll maneuvers is discussed and the usefulness to the final Tornado flight clearance is also assessed. R.J.F.

N83-30379# Aeritalia S.p.A., Torino (Italy). Bruppo Velivoli da Combattimento.

CORRELATION PROBLEMS BETWEEN FLUTTER FLIGHT TEST DATA AND GROUND TESTS/CALCULATION RESULTS FOR A VARIABLE SWEEP WING AIRCRAFT c08

G. DeFerrari, A. Lotze (MBB), and R. Pyrah (British Aerospace Aircraft Group) *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 17 p refs (For primary document see N83-30357 19-01)

Avail: NTIS HC A23/MF A01

It was shown that especially in connection with nonlinearities, either generated by structural, control system or aerodynamic

transonic effects, flutter clearance can not be based exclusively on flight testing nor on conventional flutter calculations. Flutter flight testing is a useful and required tool for flight clearance purposes but approaching areas with low flutter margins, good correlation with analytical investigations confirmed by ground resonance tests is vitally necessary, to be able to explain the physical behavior of the flutter case and to avoid unsafe conditions during flutter flight testing. If correlation between flight test and analysis is poor, possible nonlinear effects must be incorporated into the analysis. Having proven good correlation with flight testing for special test conditions, the clearance according to the most critical case during whole service life and considering all possible amplitudes has to be provided by analysis if this condition can not be reached by flight testing. R.J.F.

N83-30380*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
REAL-TIME FLUTTER ANALYSIS OF AN ACTIVE FLUTTER-SUPPRESSION SYSTEM ON A REMOTELY PILOTED RESEARCH AIRCRAFT c08
Glenn B. Gilyard and John W. Edwards *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 15 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01 CSCL 01C

Flight-test results of the first three flights of an aeroelastic research wing are described. The flight flutter-test technique used to obtain real-time damping estimates from fast-frequency sweep data was obtained and the open-loop flutter boundary determined. Nyquist analyses of sweep maneuvers appear to provide additional valuable information about flutter suppression system operation, both in terms of phase-margin estimates and as a means of evaluating maneuver quality. An error in implementing the flutter-suppression system required in a one-half nominal gain configuration, which caused the wing to be unstable at lower Mach numbers than anticipated, and the vehicle experienced closed-loop flutter on its third flight. Real-time flutter-testing procedures were improved. R.J.F.

N83-30381# Vereinigte Flugtechnische Werke-Fokker G.m.b.H., Bremen (West Germany).
FLIGHT FLUTTER TESTING WITH EMPHASIS ON THE TIP VANE METHOD c08
Helmut Zimmemann and Roger Destuynder (ONERA) *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 14 p refs Previously announced as A83-18435 (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

A short summary of the most important flight excitation systems developed and used in the last twenty years is given. Special emphasis is put on the vane excitation system. This system was developed for the flight vibration tests of the A 310 intermediate-range transport aircraft. The general, functional, and safety requirements for this system are described. Also the preliminary tests, and the set-up and handling of such a system are reported. Because the vane excitation can be measured precisely, the tip vane method offers the advantage of representing aircraft response in terms of transfer functions rather than only autospectra. The transfer function so derived together with a multi-mode matching technique were then used to determine the frequencies and damping of the aircraft modes. The multi-mode matching technique is also described. The paper also reports some results obtained by flight vibration testing of the A 300 and A 310 aircraft. R.J.F.

N83-30382# Aeritalia S.p.A., Torino (Italy). Gruppo Velivoli da Combattimento.
A THEORETICAL/EXPERIMENTAL TECHNIQUE TO EVALUATE STORE SEPARATION CHARACTERISTICS c02
F. Porrato and V. Mo *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 16 p (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

The methodology developed in AERITALIA for a few years and currently adopted to clear the separation of external stores from the parent aircraft is discussed. The tools used in this process, i.e., mathematical models, wind tunnel testings, ground and flight trials, are presented and their advantages and disadvantages briefly discussed. Particularly, the role of the matching phase between data gathered by the different techniques mentioned above to increase the reliability on store separation predictions, and hence to clear the separation of stores from the parent aircraft, is presented and discussed with a brief assessment of the method used. R.J.F.

N83-30383# Societe Nationale Industrielle Aerospatiale, Paris (France).
HELICOPTER AIR INLETS: DESIGN PROCESS, WIND TUNNEL TESTING AND CORRELATIONS WITH FLIGHT DATA c02
F. Toulmay *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 23 p refs In FRENCH; ENGLISH summary (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

Major inlet design problems of helicopter engines and ways of solving them through down-scaled models are discussed. Pressure loss, dynamic pressure recovery, pressure distortion, hot air re-ingestion, external drag, and constraints due to engine and/or aircraft architecture are among the topics discussed. Indications are given concerning the selection of model parameters, test procedure and real-time processing. R.J.F.

N83-30384# Royal Aircraft Establishment, Farnborough (England).
SYNTHESIS OF RESPONSES TO AGARD-FMP QUESTIONAIRE ON "PREDICTION TECHNIQUES AND FLIGHT CORRELATION" c02
John Williams *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 30 p (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

Correlation between flight results and wind tunnel, analytical prediction, free-flight model, and simulation methods, for performance, flying qualities, aeroelastic effects and subsystems such as store separation and inlets is discussed. The results of a survey of flight correlation and prediction techniques are given. R.J.F.

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N83-30385*# Old Dominion Univ., Norfolk, Va.
NUMERICAL OPTIMIZATION TECHNIQUES FOR BOUND CIRCULATION DISTRIBUTION FOR MINIMUM INDUCED DRAG OF NONPLANAR WINGS: COMPUTER PROGRAM DOCUMENTATION Topical Report, Mar. - Sep. 1979
John M. Kuhlman and Tzuchun Jeffrey Ku Washington NASA Aug. 1981 79 p refs
(Grant NsG-1357)
(NASA-CR-3458; NAS 1.26:3458) Avail: NTIS HC A05/MF A01 CSCL 01A

A two dimensional advanced panel far-field potential flow model of the undistorted, interacting wakes of multiple lifting surfaces was developed which allows the determination of the spanwise bound circulation distribution required for minimum induced drag. This model was implemented in a FORTRAN computer program, the use of which is documented in this report. The nonplanar wakes are broken up into variable sized, flat panels, as chosen by the user. The wake vortex sheet strength is assumed to vary linearly over each of these panels, resulting in a quadratic variation of bound circulation. Panels are infinite in the streamwise direction. The theory is briefly summarized herein; sample results are given for multiple, nonplanar, lifting surfaces, and the use of the computer program is detailed in the appendixes. Author

N83-30386*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DESIGN AND EXPERIMENTAL RESULTS FOR A FLAPPED NATURAL-LAMINAR-FLOW AIRFOIL FOR GENERAL AVIATION APPLICATIONS
Dan M. Somers Jun. 1981 125 p refs
(NASA-TP-1865; L-14409; NAS 1.60:1865) Avail: NTIS HC A06/MF A01 CSCL 01A

A flapped natural laminar flow airfoil for general aviation applications, the NLF(1)-0215F, has been designed and analyzed theoretically and verified experimentally in the Langley Low Turbulence Pressure Tunnel. The basic objective of combining the high maximum lift of the NASA low speed airfoils with the low cruise drag of the NACA 6 series airfoils has been achieved. The safety requirement that the maximum lift coefficient not be significantly affected with transition fixed near the leading edge has also been met. Comparisons of the theoretical and experimental results show generally good agreement. Author

N83-30387*# Kohlman Aviation Corp., Lawrence, Kans.
CALCULATION OF LATERAL-DIRECTIONAL STABILITY DERIVATIVES OF WINGS BY A NONPLANAR QUASI-VORTEX-LATTICE METHOD
C. Edward Lan Jan. 1981 135 p refs
(NASA-CR-165659; NAS 1.26:165659; Rept-80-001) Avail: NTIS HC A07/MF A01 CSCL 01C

The nonplanar quasi-vortex-lattice method is applied to the calculation of lateral-directional stability derivatives of wings with and without vortex-lift effect. Results for conventional configurations and those with winglets, V-tail, etc. are compared with available data. All rolling moment derivatives are found to be accurately predicted. The prediction of side force and yawing moment derivatives for some configurations is not as accurate. Causes of the discrepancy are discussed. A user's manual for the program and the program listing are also included. Author

N83-30388*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INTERACTIVE INPUT FOR THE QUICK GEOMETRY SYSTEM: USER'S MANUAL
Mary S. Adams Feb. 1981 67 p
(NASA-TM-81933; NAS 1.15:81933) Avail: NTIS HC A04/MF A01 CSCL 01A

An interactive graphics computer program was developed to create the QUICK-Geometry input definition of a model, from a set of discrete coordinate data (point description). The necessary information to access and execute the programs is included. In general, the program displays the input coordinate data and allows the user to interactively and iteratively select the analytic QUICK curves and match them visually to the coordinate data. The curve drawing subroutines are identical to those used by the QUICK geometry processor, assuring that the analytic representations will be properly interpreted. Author

N83-30389*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EXPERIMENTAL INVESTIGATION OF A 10-PERCENT-THICK HELICOPTER ROTOR AIRFOIL SECTION DESIGNED WITH A VISCOUS TRANSONIC ANALYSIS CODE
Kevin W. Noonan Jul. 1981 78 p refs
(DA Proj. 1L1-61102-AH-45)
(NASA-TP-1864; L-14182; NAS 1.60:1864;
AVRADCOM-TR-81-B-3) Avail: NTIS HC A05/MF A01 CSCL 01A

An investigation was conducted in the Langley 6- by 28-Inch Transonic Tunnel to determine the two dimensional aerodynamic characteristics of a 10-percent-thick helicopter rotor airfoil at Mach numbers from 0.33 to 0.87 and respective Reynolds numbers from 4.9 x 10 to the 6th to 9.8 x 10 to the 6th. This airfoil, designated the RC-10(N)-1, was also investigated at Reynolds numbers from 3.0 x 10 to the 6th to 7.3 x 10 to the 6th at respective Mach numbers of 0.33 to 0.83 for comparison wit the SC 1095 (with tab) airfoil. The RC-10(N)-1 airfoil was designed by the use of a viscous transonic analysis code. The results of the investigation indicate that the RC-10(N)-1 airfoil met all the design goals. At a Reynolds number of about 9.4 x 10 to the 6th the drag divergence Mach number at zero normal-force coefficient was 0.815 with a corresponding pitching-moment coefficient of zero. The drag divergence Mach number at a normal-force coefficient of 0.9 and a Reynolds number of about 8.0 x 10 to the 6th was 0.61. The drag divergence Mach number of this new airfoil was higher than that of the SC 1095 airfoil at normal-force coefficients above 0.3. Measurements in the same wind tunnel at comparable Reynolds numbers indicated that the maximum normal-force coefficient of the RC-10(N)-1 airfoil was higher than that of the NACA 0012 airfoil for Mach numbers above about 0.35 and was about the same as that of the SC 1095 airfoil for Mach numbers up to 0.5. Author

N83-30390*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LOW-SPEED AERODYNAMIC PERFORMANCE OF AN ASPECT-RATIO-10 SUPERCRITICAL-WING TRANSPORT MODEL EQUIPPED WITH A FULL-SPAN SLAT AND PART-SPAN AND FULL-SPAN DOUBLE-SLOTTED FLAPS
Harry L. Morgan, Jr. Apr. 1981 183 p refs
(NASA-TP-1805; L-13825; NAS 1.60:1805) Avail: NTIS HC A09/MF A01 CSCL 01A

An investigation was conducted in the Langley 4 by 7 Meter Tunnel to determine the static longitudinal and lateral directional aerodynamic characteristics of an advanced aspect ratio 10 supercritical wing transport model equipped with a full span leading edge slat as well as part span and full span trailing edge flaps. This wide body transport model was also equipped with spoiler and aileron roll control surfaces, flow through nacelles, landing gear, and movable horizontal tails. Six basic wing configurations were tested: (1) cruise (slats and flaps nested), (2) climb (slats deflected and flaps nested), (3) part span flap, (4) full span flap, (5) full span flap with low speed ailerons, and (6) full span flap with high speed ailerons. Each of the four flapped wing configurations was tested with leading edge slat and trailing edge flaps deflected to settings representative of both take off and landing conditions. Tests were conducted at free stream conditions corresponding to Reynolds number of 0.97 to 1.63 x 10 to the 6th power and corresponding Mach numbers of 0.12 to 0.20, through an angle of attack range of 4 to 24, and a sideslip angle range of -10 deg to 5 deg. The part and full span wing configurations were also tested in ground proximity. Author

N83-30391*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
WALL-TEMPERATURE EFFECTS ON THE AERODYNAMICS OF A HYDROGEN-FUELED TRANSPORT CONCEPT IN MACH 8 BLOWDOWN AND SHOCK TUNNELS
Jim A. Penland, Don C. Marcum, Jr., and Sharon H. Stack Jul. 1983 61 p refs
(NASA-TP-2159; L-15100; NAS 1.60:2159) Avail: NTIS HC A04/MF A01 CSCL 01A

Results are presented from two separate tests on the same blended wing-body hydrogen fueled transport model at a Mach number of about 8 and a range of Reynolds numbers (based on theoretical body length) of 0.597 x 10 to the 6th power to about 156.22 x 10 to the 6th power. Tests were made in conventional hypersonic blowdown tunnel and a hypersonic shock tunnel at angles of attack of -2 deg to about 8 deg, with an extensive study made at a constant angle of attack of 3 deg. The model boundary-layer flow varied from laminar at the lower Reynolds numbers to predominantly turbulent at the higher Reynolds numbers. Model wall temperatures and stream static temperatures varied widely between the two tests, particularly at the lower Reynolds numbers. These temperature differences resulted in marked variations of the axial-force coefficients between the two tests, due in part to the effects of induced pressure and viscous interaction variations. The normal-force coefficient was essentially independent of Reynolds number. Analysis of results utilized current theoretical computer programs and basic boundary-layer theory. Author

N83-30392*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PERSPECTIVES ON THE MIXING OF A ROW OF JETS WITH A CONFINED CROSSFLOW
J. D. Holdeman 29 Jun. 1983 14 p refs Presented at the 19th Joint Propulsion Conf., Seattle, 27-29 Jun. 1983; sponsored by AIAA, SAE and ASME
(NASA-TM-83457; E-1772; NAS 1.15:83457; AIAA-83-1200) Avail: NTIS HC A02/MF A01 CSCL 20D

An interactive computer code, written for a microcomputer, is presented which displays 2-D and 3-D oblique plots of the temperature distribution downstream of jets mixing with a confined crossflow, for either single-side or opposed jet injection. Temperature profiles calculated with this routine are presented to show the effects of flow and geometric variables on the mixing. Examples are also shown to illustrate the different perspectives on the mixing available by exercising various view options. In addition, the program is used to calculate profiles for opposed rows of jets with their centerlines in-line, by assuming that the confining effect of an opposite wall is equivalent to that of a plane of symmetry between opposed jets. Author

N83-30393*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EXPERIMENTS IN DILUTION JET MIXING
J. D. Holdeman, R. Srinivasan (Garrett Turbine Engine Co., Phoenix, Ariz.), and A. Berenfeld (Garrett Turbine Engine Co., Phoenix, Ariz.) 29 Jun. 1983 15 p refs Presented at 19th Joint Propulsion Conf., Seattle, 27-29 Jun. 1983; sponsored by AIAA, SAE and ASME
(NASA-TM-83434; E-1727; NAS 1.15:83434; AIAA-83-1201) Avail: NTIS HC A02/MF A01 CSCL 20D

Experimental results are given on the mixing of a single row of jets with an isothermal mainstream in a straight duct, to include flow and geometric variations typical of combustion chambers in gas turbine engines. The principal conclusions reached from these experiments were: at constant momentum ratio, variations in density ratio have only a second-order effect on the profiles; a first-order approximation to the mixing of jets with a variable temperature mainstream can be obtained by superimposing the jets-in-an isothermal-crossflow and mainstream profiles; flow area convergence, especially injection-wall convergence, significantly improves the mixing; for opposed rows of jets, with the orifice centerlines in-line, the optimum ratio of orifice spacing to duct height is one half of the optimum value for single side injection at the same momentum ratio; and for opposed rows of jets, with the orifice centerlines staggered, the optimum ratio of orifice spacing to duct height is twice the optimum value for single side injection at the same momentum ratio. R.J.F.

N83-30394*# National Aeronautics and Space Administration, Washington, D. C.
RAIN AND DEICING EXPERIMENTS IN A WIND TUNNEL
Guy Fasso Jun. 1983 13 p Transl. into ENGLISH of conf. paper presented at the 8th Congr. Intern. Aeronautique, 1967 p 1-14 Congr. held in Paris, 29-31 May 1967 Original language document was announced as A68-38546 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77077; NAS 1.15:77077) Avail: NTIS HC A02/MF A01 CSCL 01A

Comments on films of tests simulating rain and ice conditions in a wind tunnel are presented, with the aim of studying efficient methods of overcoming the adverse effects of rain and ice on aircraft. In the experiments, lifesize models and models of the Mirave 4 aircraft were used. The equipment used to simulate rain and ice is described. Different configurations of landing and takeoff under conditions of moderate or heavy rain at variable angles of incidence and of skipping and at velocities varying from 30 to 130 m/sec are reproduced in the wind tunnel. The risks of erosion of supersonic aircraft by the rain during the loitering and approach phases are discussed. S.L.

N83-30395# Midwest Research Inst., Golden, Colo. Renewable Resource Assessment and Instrumentation Branch.
WINDMILL WAKE TURBULENCE DECAY: A PRELIMINARY THEORETICAL MODEL
E. A. Bossanyi Feb. 1983 31 p refs
(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)
(DE83-008162; SERI/TR-635-1280) Avail: NTIS HC A03/MF A01

The results are given of initial theoretical attempts to predict dynamic wake characteristics, particularly turbulence decay, downstream of wind turbine generators in order to assess the potential for acoustic noise generation in clusters or arrays of turbines. These results must be considered preliminary, because the model described is at least partially based on the assumption of isotrophy in the turbine wakes; however, an isotropic conditions may actually exist, particularly in the near-wake regions. The results indicate that some excess spectral energy may still exist. The turbine-generated turbulence from one machine can reach the next machine in the cluster and, depending on the turbulent wavelengths critical for acoustic noise production and perhaps structural excitation, this may be a cause for concern. Such a situation is most likely to occur in the evening or morning, during the transition from the daytime to the nocturnal boundary layer and vice-versa, particularly at more elevated sites where the winds tend to increase after dark. DOE

N83-30396# Imperial Coll. of Science and Technology, London (England). Dept. of Aeronautics.
THE EVALUATION OF SOME COLLISION MODELS USED FOR MONTE-CARLO CALCULATIONS OF DIATOMIC RAREFIED HYPERSONIC FLOWS
J. Davis, R. G. Dominy, J. K. Harvey, and M. N. Macrossan Dec. 1982 29 p refs
(IC-Aero-82-03; ISSN-0308-7247) Avail: NTIS HC A03/MF A01

Intermolecular collision models used in Monte-Carlo direct simulation computations were assessed by comparing the predictions given for two contrasting flows with experimental results. In one flow viscous effects were predominant; in the other the rapid compression ahead of a blunt body was the feature concentrated upon. In both examples the flows were rarefied and hypersonic and the gas was diatomic and rotationally exerted. Because of its theoretical and demonstrated versatility the Morse potential combined with the variable phi energy exchange is recommended as a general purpose collision model. Author (ESA)

N83-30397# Imperial Coll. of Science and Technology, London (England). Dept. of Aeronautics.
HEAT TRANSFER AND SKIN FRICTION MEASUREMENTS IN A HYPERSONIC TURBULENT BOUNDARY LAYER AT M = 9
A. J. Edwards and R. Hillier Aug. 1982 43 p refs
(Contract MoD-AT/2037/084)
(IC-Aero-82-04; ISSN-0308-7247) Avail: NTIS HC A03/MF A01

Surface heat transfer and skin friction measurements in a two dimensional flat plate hypersonic turbulent boundary layer with natural transition is described. Both high and low Reynolds number conditions were used in the wind tunnel test, and a free stream temperature of 58 K was employed. Comparisons between the heat transfer results and theories show the lack of an adequate boundary layer prediction method under these conditions. The values for the skin friction deduced from Preston tube measurements, from velocity profiles and from heat transfer measurements are compared, highlighting the need for more detailed work on the direct measurement of skin friction. Author (ESA)

N83-30358# Office National d'Etudes et de Recherches Aeronautiques, Paris (France).
PROGRESS IN WIND TUNNEL TEST TECHNIQUES AND IN THE CORRECTIONS AND ANALYSIS OF THE RESULTS
T. W. Binion, Jr. (AEDC), X. Vaucheret, and X. Bouis *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 31 p refs
(For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

N83-30363# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FLIGHT AND WIND-TUNNEL CORRELATION OF BOUNDARY-LAYER TRANSITION ON THE AEDC TRANSITION CONE
David F. Fisher and N. Sam Dougherty, Jr. (Rockwell International) *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 25 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

N83-30382# Aeritalia S.p.A., Torino (Italy). Gruppo Velivoli da Combattimento.
A THEORETICAL/EXPERIMENTAL TECHNIQUE TO EVALUATE STORE SEPARATION CHARACTERISTICS
F. Porrato and V. Mo *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 16 p (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

N83-30383# Societe Nationale Industrielle Aerospatiale, Paris (France).
HELICOPTER AIR INLETS: DESIGN PROCESS, WIND TUNNEL TESTING AND CORRELATIONS WITH FLIGHT DATA
F. Toulmay *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 23 p refs In FRENCH; ENGLISH summary (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

N83-30384# Royal Aircraft Establishment, Farnborough (England).
SYNTHESIS OF RESPONSES TO AGARD-FMP QUESTIONAIRE ON "PREDICTION TECHNIQUES AND FLIGHT CORRELATION"
John Williams *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 30 p (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N83-30398 Prins Maurits Lab. TNO, Rijswijk (Netherlands).
BAIL OUT SIMULATION OF AN F-16 EJECTION SEAT BY MEANS OF A BLAST SIMULATOR [BAIL-OUT SIMULATIE VAN EEN F-16 SCHIETSTOEL MBV EEN BLASTSIMULATOR]
W. Haverdings Mar. 1982 17 p refs In DUTCH; ENGLISH summary
(Contract A79/KLu/155)
(PML-1982-7; TDCK-76716) Copyright. Avail: Issuing Activity

The functioning of the mode switch in the ejection seat of an F-16 jet fighter during bailout was studied in a 2 m diameter blast simulator. Pitot pressures at the mode switch position encountered in reality were used. The influence on the mode switch of different types of helmet placed upon the head of a dummy in the ejection seat was investigated. Although the blast simulator is capable of simulating a bailout under certain conditions, the static pressure is too high compared to the dynamic pressure. Since the flow at the pitot input can be assumed stationary, the experimental investigation can better be performed in a wind tunnel. Author (ESA)

N83-30399# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.
EJECTION SEAT-MOUNTED CREWMEMBER RESTRAINT INTEGRATED WITH SURVIVAL VEST AND FLOTATION
Thomas J. Zenobi 15 Nov. 1982 33 p
(AD-A126859; NADC-82216-60) Avail: NTIS HC A03/MF A01 CSCL 06/7

The Navy is developing a flight restraint integrated with a survival vest and life preserver which is mounted on the aircraft ejection seat. This integration uses three standard items which are minimally modified. This development is intended to improve comfort for the crewmember and to simplify logistic support without sacrificing performance. GRA

N83-31190 McDonnell Aircraft Co., St. Louis, Mo.
A REALISTIC APPROACH TO AIRCRAFT LIGHTNING PROTECTION
G. L. Weinstock *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 3 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31192 Boeing Military Airplane Development, Seattle, Wash.
ATMOSPHERIC ELECTRICITY THREAT DEFINITION FOR AIRCRAFT LIGHTNING PROTECTION
B. G. Melander *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 37 p refs (For primary document see N83-31163 19-47)
(Contract F33615-82-C-3406)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31193 Bundesamt fuer Wehrtechnik und Beschaffung, Koblenz (West Germany).
LIGHTNING STRIKES TO AIRCRAFT OF THE GERMAN FEDERAL ARMED FORCES
Wilfried Ziegler *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 8 p ref (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31195* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
NASA F-106B LIGHTNING GROUND TESTS
B. D. Heady (McDonnell Aircraft Co.) and K. S. Zeisel (McDonnell Aircraft Co.) *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 7 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31196 Royal Aircraft Establishment, Farnborough (England).
INDUCED TRANSIENTS IN A SIMULATED LIGHTNING TEST OF THE FLY-BY-WIRE JAGUAR AIRCRAFT
R. H. Evans and J. Bishop *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 14 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31207 Syracuse Research Corp., N. Y.
THE EFFECTS OF NEW TECHNOLOGY TRENDS ON AIRCRAFT LIGHTNING VULNERABILITY AND THE CAPABILITY TO IDENTIFY TECHNOLOGY DEFICIENCIES
D. T. Auckland, R. F. Wallenberg, and J. A. Birken (Naval Air Systems Command) *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 9 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31208 Syracuse Research Corp., N. Y.
UNPROTECTED RADOME LIGHTNING TESTS AND IMPLICATIONS TO KEVLAR AIRFRAME DESIGNS
D. T. Auckland and J. A. Birken (Naval Air System Command) *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 6 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31210 Naval Research Lab., Washington, D. C.
ELECTROSTATIC THEORY APPLIED TO HELICOPTER DISCHARGING
Robert V. Anderson *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 8 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31211 Westland Helicopters Ltd., Yeovil (England).
ADVANCED TESTING OF LIGHTNING PROTECTION SCHEMES FOR COMPOSITE MAIN ROTOR BLADES (HELICOPTER)
M. J. Heseltine *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 9 p ref (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31214 Aeronautical Systems Div., Wright-Patterson AFB, Ohio.
LIGHTNING INTERACTION WITH USAF AIRCRAFT
John C. Corbin *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 6 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31220 Sandia Labs., Albuquerque, N. Mex.
PERFORMANCE OF THE SANDIA LIGHTNING SIMULATOR DURING F-14A AND F/A-18 AIRCRAFT LIGHTNING TESTS
Ronald I. Ewing *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 4 p (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31221 Haefely (Emile) and Co. Ltd., Basel (Switzerland).
AN IMPULSE GENERATOR TO SIMULATE LIGHTNING EFFECTS ON AIRCRAFT
E. Gockenbach, M. Modrusan, and H. Sutter *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 11 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31222 Lightning and Transients Research Inst., St. Paul, Minn.
MEASUREMENTS AND THEORETICAL ANALYSIS OF A FULL SCALE NEMP
J. D. Robb and R. A. Perala (Electro Magnetic Associates) *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 12 p refs Sponsored in part by AFWAL (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31224 Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
VULNERABILITY ASSESSMENT OF ELECTRICAL/ELECTRONIC SUBSYSTEMS AND EQUIPMENT TO ATMOSPHERIC ELECTRICITY
Jack R. Lippert *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 8 p (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31230 Boeing Commercial Airplane Co., Seattle, Wash.
P-STATIC FLIGHT EVALUATION OF A LARGE JET AIRCRAFT
Charles H. King *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 43 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31236* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CONDITIONS CONDUCIVE TO LIGHTNING STRIKING AN AIRCRAFT IN A THUNDERSTORM
Vladislav Mazur (Oklahoma Univ.), Bruce D. Fisher, and John C. Gerlach *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 7 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31240 SRI International Corp., Menlo Park, Calif.
ALLOCATION OF PROTECTION
E. F. Vance, J. E. Nanevicz, W. Graf, and J. M. Hamm *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 5 p (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31242 Boeing Vertol Co., Philadelphia, Pa.
PROTECTING THE WORLD'S LARGEST COMMERCIAL HELICOPTER FROM ATMOSPHERIC HAZARDS
Gerald A. Heiderscheidt *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 17 p refs (For primary document see N83-31163 19-47)
Copyright. Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N83-30400# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.
REPORT FROM THE INTERNATIONAL CONGRESS OF NAVIGATION
Sylve Arnzen and Erik Skarman 13 Apr. 1983 45 p In SWEDISH; ENGLISH summary Held at Paris, 21-24 Sep. 1982
(FOA-C-20489-E3; ISSN-0347-3694) Avail: NTIS HC A03/MF A01

Integrated navigation for sea and air applications was discussed. Sensor accuracy; laser gyroscopes; ship navigation processing system; MAN NAV with Decca; Das Azimuth; SAREL; DN Doppler; navigation for aircraft; DR integrated with Omega and with Loran; carrier aircraft inertial navigation, Kalman filter applications; integrated systems for helicopters; maritime data and control collision avoidance, safety at sea; and human factors were considered. Author (ESA)

N83-30368# Royal Aircraft Establishment, Farnborough (England). Aerodynamics Dept.
THE USE OF FREE-FLIGHT MODELS FOR THE PREDICTION OF DEPARTURE CONTROL
G. F. Moss, A. Jean Ross, Geraldine F. Edwards, and E. B. Jefferies *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 17 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N83-30401*# Boeing Commercial Airplane Co., Seattle, Wash. Preliminary Design Dept.

INTEGRATED APPLICATION OF ACTIVE CONTROLS (IAAC) TECHNOLOGY TO AN ADVANCED SUBSONIC TRANSPORT PROJECT: WING PLANFORM STUDY AND FINAL CONFIGURATION SELECTION Final Report, Jun. 1979 - Oct. 1980

Jun. 1981 382 p refs

(Contract NAS1-15325)

(NASA-CR-165630; NAS 1.26:165630; D6-48676) Avail: NTIS HC A17/MF A01 CSCL 01C

The Wing Planform Study and Final Configuration Selection Task of the Integrated Application of Active Controls (IAAC) Technology Project within the Energy Efficient Transport Program is documented. Application of Active Controls Technology (ACT) in combination with increased wing span resulted in significant improvements over the Conventional Baseline Configuration (Baseline) and the Initial ACT Configuration previously established. The configurations use the same levels of technology, takeoff gross weight, and payload as the Baseline. The Final ACT Configuration (Model 768-107) incorporates pitch-augmented stability (which enabled an approximately 10% aft shift in cruise center of gravity and a 44% reduction in horizontal tail size), lateral/directional-augmented stability, an angle-of-attack limiter, and wing-load alleviation. Flutter-mode control was not beneficial for this configuration. This resulted in an 890 kg (1960 lb) reduction in airplane takeoff gross weight and a 9.8% improvement in cruise lift/drag. At the Baseline mission range (3589 km 1938 nmi), this amounts to 10% block-fuel reduction. Results of this task strongly indicate that the IAAC Project should proceed with the Final ACT evaluation, and begin the required control system development and test. Author

N83-30402*# Boeing Commercial Airplane Co., Seattle, Wash.

NACELLE AERODYNAMIC AND INERTIAL LOADS (NAIL) PROJECT Test Report, Oct. 1979 - Nov. 1980

May 1981 352 p refs

(Contracts NAS1-15325; NAS3-20632)

(NASA-CR-168712; NAS 1.26:168712) Avail: NTIS HC A16/MF A01 CSCL 01C

The testing was conducted on the Boeing-owned 747 RA001 test bed airplane during the concurrent 767/JT9D-7R4 engine development program. Following a functional check flight conducted from Boeing Field International (BFI) on 3 October 1980, the airplane and test personnel were ferried to Valley Industrial Park (GSG) near Glasgow, Montana, on 7 October 1980. The combined NAL and 7670JT9D-7R4 test flights were conducted at the Glasgow remote test site, and the airplane was returned to Seattle on 26 October 1980. Author

N83-30403*# Boeing Commercial Airplane Co., Seattle, Wash.

ADVANCED COMPOSITE ELEVATOR FOR BOEING 727 AIRCRAFT Quarterly Technical Progress Report, 23 Nov. 1978 - 22 Feb. 1979

22 Feb. 1979 30 p

(Contract NAS1-14952)

(NASA-CR-172910; NAS 1.26:172910; QTPR-7) Avail: NTIS HC A03/MF A01 CSCL 01C

Detail design activities are reported for a program to develop an advanced composites elevator for the Boeing 727 commercial transport. Design activities include discussion of the full scale ground test and flight test activities, the ancillary test programs, sustaining efforts, weight status, and the production status. Prior to flight testing of the advanced composites elevator, ground, flight flutter, and stability and control test plans were reviewed and approved by the FAA. Both the ground test and the flight test were conducted according to the approved plan, and were witnessed by the FAA. Three and one half shipsets have now been fabricated without any significant difficulty being encountered. Two elevator system shipsets were weighed, and results validated the 26% predicted weight reduction. The program is on schedule. Author

N83-30404*# Lockheed-California Co., Burbank.

ADVANCED MANUFACTURING DEVELOPMENT OF A COMPOSITE EMPENNAGE COMPONENT FOR L-1011 AIRCRAFT. PHASE 2: DESIGN AND ANALYSIS Final Report

A. C. Jackson, J. F. Crocker, J. C. Ekvall, R. R. Eudaily, B. Mosesian, R. R. VanCleave, and J. VanHamersveld Apr. 1981 215 p refs

(Contract NAS1-14000)

(NASA-CR-165634; NAS 1.26:165634; LR-29723) Avail: NTIS HC A10/MF A01 CSCL 01C

The composite fin design consists of two one-piece cocured covers, two one-piece cocured spars and eleven ribs. The lower ribs are truss ribs with graphite/epoxy caps and aluminum truss members. The upper three ribs are a sandwich design with graphite/epoxy face sheets and a syntactic epoxy core. The design achieves a 27% weight saving compared to the metal box. The fastener count has been reduced from over 40,000 to less than 7000. The structural integrity of the composite fin was verified by analysis and test. The static, fail-safe and flutter analyses were completed. An extensive test program has established the material behavior under a range of conditions and critical subcomponents were tested to verify the structural concepts. Author

N83-30405*# Lockheed-California Co., Burbank.

ADVANCED COMPOSITE AILERON FOR L-1011 TRANSPORT AIRCRAFT: GROUND TESTS AND FLIGHT EVALUATION Final Report, Jan. - Dec. 1980

C. F. Griffin Feb. 1981 41 p

(Contract NAS1-15069)

(NASA-CR-165664; NAS 1.26:165664; LR-29676) Avail: NTIS HC A03/MF A01 CSCL 01C

A composite aileron and a metal aileron were subjected to a series of comparative stiffness and vibration tests. These tests showed that the stiffness and vibration characteristics of the composite aileron are similar to the metal aileron. The first composite ground test article was statically tested to failure which occurred at 139 percent of design ultimate load. The second composite ground test article was tested to verify damage tolerance and fail-safe characteristics. Visible damage was inflicted to the aileron and the aileron was subjected to one lifetime of spectrum fatigue loading. After conducting limit load tests on the aileron, major damage was inflicted to the cover and the aileron was loaded to failure which occurred at 130 percent of design ultimate load. A shipset of composite ailerons were installed on Lockheed's L-1011 flight test aircraft and flown. The composite aileron was flutter-free throughout the flight envelope. Author

N83-30406*# Lockheed-California Co., Burbank.

ADVANCED COMPOSITE AILERON FOR L-1011 TRANSPORT AIRCRAFT: DESIGN AND ANALYSIS Final Report, Apr. 1977 - Oct. 1980

C. F. Griffin, L. D. Fogg, and E. G. Dunning Apr. 1981 171 p refs

(Contract NAS1-15069)

(NASA-CR-165635; NAS 1.26:165635; LR-29635) Avail: NTIS HC A08/MF A01 CSCL 01C

Detail design of the composite aileron has been completed. The aileron design is a multi-rib configuration with single piece upper and lower covers mechanically fastened to the substructure. Covers, front, spar and ribs are fabricated with graphite/epoxy tape or fabric composite material. The design has a weight savings of 23 percent compared to the aluminum aileron. The composite aileron has 50 percent fewer fasteners and parts than the metal aileron and is predicted to be cost competitive. Structural integrity of the composite aileron was verified by structural analysis and an extensive test program. Static, failsafe, and vibration analyses have been conducted on the composite aileron using finite element

models and specialized computer programs for composite material laminates. The fundamental behavior of the composite materials used in the aileron was determined by coupon tests for a variety of environmental conditions. Critical details of the design were interrogated by static and fatigue tests on full-scale subcomponents and subassemblies of the aileron. Author

N83-30407*# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.
LONGITUDINAL FLYING QUALITIES CRITERIA FOR SINGLE-PILOT INSTRUMENT FLIGHT OPERATIONS Final Report, 5 Apr. 1979 - 30 Nov. 1982
Robert F. Stengel and Aharon Bar-Gill Jul. 1983 249 p refs
(Contract NAS1-15764)
(NASA-CR-166084; NAS 126:166084; MAE-1576-T) Avail: NTIS HC A11/MF A01 CSCL 01C

Modern estimation and control theory, flight testing, and statistical analysis were used to deduce flying qualities criteria for General Aviation Single Pilot Instrument Flight Rule (SPIFR) operations. The principal concern is that unsatisfactory aircraft dynamic response combined with high navigation/communication workload can produce problems of safety and efficiency. To alleviate these problems. The relative importance of these factors must be determined. This objective was achieved by flying SPIFR tasks with different aircraft dynamic configurations and assessing the effects of such variations under these conditions. The experimental results yielded quantitative indicators of pilot's performance and workload, and for each of them, multivariate regression was applied to evaluate several candidate flying qualities criteria. S.L.

N83-30408# Air Force Flight Test Center, Edwards AFB, Calif.
ENVIRONMENTAL CONTROL SUBSYSTEMS FLIGHT TEST HANDBOOK Final Report
Kenneth J. Lush Dec. 1982 159 p refs
(AD-A126872; AFFTC-TIH-82-2) Avail: NTIS HC A08/MF A01 CSCL 13/1

This handbook provides AFFTC engineers with guidelines for the testing of environmental control subsystems. Future technological advances, characteristics of individual aircraft or programs may necessitate other methods being used in some cases. A background is provided on environmental control subsystems and the requirements to which they are designed. Details are provided of individual tests, test support requirements and evaluations criteria and suggestions made for presentation of results. GRA

N83-30409# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
TRAUMATIC OCCLUSION OF THE VERTEBRAL ARTERY CAUSED BY NECK ROTATION
T. Goya, K. Kinoshita, and K. Mihara 17 Feb. 1983 14 p refs Transl. into ENGLISH from Noshinkei Gaika (Japan), v. 7, no. 12, 1979 p 1197-1202
(AD-A126922; FTD-ID(RS)T-1723-82) Avail: NTIS HC A02/MF A01 CSCL 06/5

Vertebral artery occlusion due to the sudden rotation of the neck is discussed. A case history is given. The importance of vertebral angiography is discussed. R.J.F.

N83-30410# Army Aviation Engineering Flight Activity, Edwards AFB, Calif.
LIMITED ARTIFICIAL AND NATURAL ICING TEST OF THE OV-ID (RE-EVALUATION) Final Report, 1 Feb. - 3 May 1982
Ronald B. Carpenter, Robert N. Ward, and Robert D. Robbins Jun. 1982 83 p refs
(AD-A127191; USAAEFA-81-21) Avail: NTIS HC A05/MF A01 CSCL 08/12

The USAAEFA conducted an icing evaluation of the engine inlets of an OV-1D aircraft. The test included artificial icing flights in St. Paul, Minnesota and natural icing flights in Salem, Oregon. A total of 13 test flights, 8 artificial tests and 5 natural tests, totalling 22.8 hours were performed. Total cloud immersion time was 4.2 hours for artificial icing and 6.5 for natural icing. A range of temperatures, liquid water contents and droplet sizes were experienced. The engine inlet ice protection system was modified three times. The modifications included increased electrical power available, increased duty times of heating elements, and addition of insulation in the cowling. The No. 2 engine final configuration cowling produced the most favorable ice accretion characteristics. However, in all cases, ice formed on the propeller blades, propeller spinners and propeller spinner afterbody. In artificial icing tests, ice was found inside the engine inlet. Aircraft performance was significantly degraded apparently due to ice accretion on the propeller blades. Two deficiencies were identified: the inability of the windshield anti-ice system to clear the windshield of ice; and, significant quantities of ice forming on the propeller spinner afterbody. GRA

N83-30361# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
GROUND/FLIGHT CORRELATION ON THE ALPHA-JET EXPERIMENTAL AIRCRAFT WITH A TRANSONIC WING: A COMPARISON BETWEEN WIND TUNNEL AND FLIGHT RESULTS FOR AERODYNAMIC PERFORMANCE
D. Jacob, D. Welte, and H. Wonnenberg *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 14 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

N83-30362# Office National d'Etudes et de Recherches Aeronautiques, Paris (France).
GROUND/FLIGHT CORRELATION ON THE ALPHA-JET EXPERIMENTAL AIRCRAFT WITH A TRANSONIC WING: A COMPARISON OF THE WING PRESSURE DISTRIBUTION AND LOCAL WAKE SURVEY FROM ANALYTICAL, WIND TUNNEL AND FLIGHT RESULTS
H. Buers (Dornier G.m.b.H.), V. Schmitt, and J. Lerat *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 20 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

N83-30364# Vereinigte Flugtechnische Werke-Fokker G.m.b.H., Bremen (West Germany).
EXPERIMENTAL INVESTIGATIONS OF TRANSPORT AIRCRAFT LOW SPEED ENGINE INTERFERENCE EFFECTS AND FLIGHT TEST CORRELATION
B. Ewald and W. Burgsmueller *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 15 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

N83-30365# Canadair Ltd., Montreal (Quebec).
COMPARISON OF PREDICTION, WIND TUNNEL AND FLIGHT TEST DATA FOR THE CANADAIR CHALLENGER TURBOFAN AIRCRAFT
Fotis Mavriplis *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 14 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

N83-30366# British Aerospace Aircraft Group, Warton (England).
LESSONS FROM TORNADO AFTERBODY DEVELOPMENT
D. C. Leyland *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 15 p (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

N83-30367# Avions Marcel Dassault, Saint-Cloud (France). Dept. Dynamique du Vol.
THE HIGH ANGLE OF ATTACK BEHAVIOR OF A COMBAT AIRCRAFT: CORRELATION BETWEEN PREDICTION AND FLIGHT [COMPORTEMENT A GRANDE INCIDENCE D'UN AVION DE COMBAT: CORRELATION ENTRE LES PREVISIONS ET LE VOL]
Paul-Louis Mathe *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 8 p In FRENCH (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

N83-30369# Saab-Scania, Linkoping (Sweden).
COMPARISON OF FLIGHT AND WIND TUNNEL BUFFETING MEASUREMENTS ON THE SAAB 105 AIRCRAFT
S. H. Teige, B. S. A. Nilsson, S. J. Boersen (NLR), and A. N. Kraan (NLR) *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 10 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

N83-30371# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
AERODYNAMIC MODEL IDENTIFICATION FROM DYNAMIC FLIGHT TEST DATA AND WIND TUNNEL EXPERIMENTS
J. A. Mulder, J. G. denHollander, and H. Binkhorst *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 21 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

N83-30373# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
CORRELATION ASPECTS OF ANALYTICAL, WIND TUNNEL AND FLIGHT TEST RESULTS FOR A HINGELESS ROTOR HELICOPTER
J. Kaletka and H.-J. Langer *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 16 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

N83-30377# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Military Aircraft Div.
GROUND AND FLIGHT TEST TECHNIQUES USED FOR PROOF OF STRUCTURAL INTEGRITY OF THE TORNADO COMBAT AIRCRAFT
Karl Knauer and O. Sensburg *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 48 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

N83-30378# British Aerospace Aircraft Group, Warton (England). Aircraft Group.
COMPARISON OF FLIGHT LOADS MEASUREMENTS RESULTS AND PREDICTION FOR TORNADO
J. R. J. Dovey and G. Moretti *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 19 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

N83-30716# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
DETERMINATION OF THE DYNAMIC ENVIRONMENT OF THE F/FB-111 TAIL POD ASSEMBLY
Janice Chinn and Phyllis Bolds *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 3 May 1982 p 115-129 refs (For primary document see N83-30709 19-31)
Avail: NTIS HC A12/MF A01 CSCL 01/3

N83-30717# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
AN ASSESSMENT OF THE A-10'S CAPABILITY TO OPERATE ON ROUGH SURFACES
Tony G. Gerardi and David L. Morris *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 3 May 1982 p 131-143 refs (For primary document see N83-30709 19-31)
Avail: NTIS HC A12/MF A01 CSCL 01/3

N83-30769# Imperial Coll. of Science and Technology, London (England).
VIBRATION ANALYSIS OF A HELICOPTER PLUS AN EXTERNALLY-ATTACHED STRUCTURE
D. J. Ewins, J. M. M. Silva, and G. Maleci *In* Shock and Vibration Information Center The Shock and Vibration Bull., no. 50, part 2 Sep. 1980 p 155-172 refs 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 01C

N83-30790# Lockheed Missiles and Space Co., Sunnyvale, Calif.
MODIFICATION OF FLIGHT VEHICLE VIBRATION MODES TO ACCOUNT FOR DESIGN CHANGES
C. W. Coale and M. R. White *In* Shock and Vibration Bulletin, no. 50, part 3 Sep. 1980 p 163-178 (For primary document see N83-30778 19-31)
Avail: NTIS HC A10/MF A01 CSCL 01C

N83-30796*# Lockheed-California Co., Burbank.
SONIC FATIGUE TESTING OF THE NASA L-1011 COMPOSITE AILERON
J. Soovere *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50., Part 4 Sep. 1980 p 13-24 refs (For primary document see N83-30794 19-31)
(Contract NAS1-15069)
Avail: NTIS HC A11/MF A01 CSCL 01C

N83-31189 Technische Univ., Hamburg (West Germany).
DETECTION AND RANGING OF ELECTRIC CHARGED HELICOPTERS
H. Trinks and J. L. terHaseborg (Hochschule der Bundeswehr, Hamburg) *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 8 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N83-30411 Royal Aircraft Establishment, Farnborough (England).
RECOMMENDED COLOURS FOR USE ON AIRBORNE DISPLAYS
J. Laycock 11 Nov. 1982 95 p refs
(RAE-TR-82110; RAE-FS(F)-190; BR86911) Copyright. Avail: Issuing Activity

The derivation of color standards is outlined, and the unsuitability of these standards for electronic displays is pointed out. A computational procedure which enables color boundaries to be specified is described. Data derived using the procedure are presented. Author (ESA)

N83-30412# National Aeronautics and Space Administration, Washington, D. C.
INSTALLATION, VALIDATION AND FLIGHT EVALUATION OF THE FEDERAL AVIATION ADMINSTRATION'S HEAD-UP DISPLAY SYSTEM Final Report
Barry C. Scott, Charles O. Masters, John J. Ryan, and Alvan T. Brazer Atlantic City, N.J. FAA Apr. 1983 172 p Prepared in cooperation with FAA, Atlantic City, N.J.
(FAA Proj. 073-320-510)
(NASA-TM-85255; NAS 1.15:85255; DOT/FAA/CT-82/92; DOT/FAA/PM-83/5) Avail: NTIS HC A08/MF A01 CSCL 01D

Selected activities and results associated with the installation, validation, and flight evaluation of Head-Up Display (HUD) research system as installed in a Boeing 727-100 aircraft is documented. Requisite installation, boresight, and flight validation activities, along with results obtained from a combined flight experience/flight evaluation exercise employing government pilots are presented. Pilot comments addressing HUD system performance, display symbology, control low responses, hardware implementation, and operational modes are addressed. The HUD, a one of a kind flightpath oriented research HUD, was evaluated in both an inertial (INS) referenced mode and an airmass referenced mode. Overwhelmingly, there was a strong preference for the INS referenced HUD mode. S.L.

N83-30413# Boeing Military Airplane Development, Wichita, Kans. Mechanical/Electrical Systems Technology Organization.
CALIBRATION OF C-130 LIGHTNING CHARACTERIZATION SENSORS Final Technical Report, 1 Jul. 1981 - 30 Sep. 1982
W. P. Geren Wright-Patterson AFB, Ohio AFWAL Dec. 1982 47 p refs
(Contract F33615-81-C-3409; AF Proj. 2402)
(AD-A127344; AFWAL-TR-82-3095) Avail: NTIS HC A03/MF A01 CSCL 01/3

An analytical model for calculating transfer functions relating the C-130 lightning sensor responses to incident electromagnetic fields was developed. The model consists of two components; a low frequency non-resonant term and a frequency-dependent term including airframe resonances. The latter are calculated for the frequency range 1-10 MHz and compared with measured data. Recommendations for removing airframe resonances from the measured data are presented. Author (GRA)

N83-30414# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
MODERN DISPLAY TECHNOLOGIES FOR AIRBORNE APPLICATIONS
Apr. 1983 239 p refs Lecture series presented at London, 6-7 Jun. 1983, Rome, 9-10 Jun. 1983, and Fort Monmouth, N.J., 16-17 1983
(AGARD-LS-126; ISBN-92-835-1449-1) Avail: NTIS HC A11/MF A01

Electronic displays for airborne application was discussed. Changes in display technology and applications which are evident in many fields, and result from the increasing use of digital data processors and the need to efficiently interface them to human operations are outlined. Topics discussed include: human factors aspect of diplays, cockpit environment, cathode ray tubes, image generation on matrix displays, light emitting diodes, liquid crystal displays, electroluminescent displays, vacuum fluorescent tubes, large area gas discharge displays or plasma displays and optical techniques for airborne displays. For individual titles, see N83-30415 through N83-30426.

N83-30415# Technische Hogeschool, Twente (Netherlands).
HUMAN FACTORS ASPECTS OF DISPLAYS
D. Bosman *In* AGARD Mod. Display Technol. for Airborne Appl. Apr. 1983 28 p refs (For primary document see N83-30414 19-06)
Avail: NTIS HC A11/MF A01

A total display system is a window, which permits the operator (pilot) to perceive the state and the dynamics of all the parameters which are relevant to this task is discussed. The performance of the visual interface between machine and brain is determined by technical and ergonomic factors. A basis for better interpretation of such data in assessing display performance specifications is described. E.A.K.

N83-30416# Massachusetts Inst. of Tech., Cambridge. Dept. of Aeronautics and Astronautics.
COCKPIT ENVIRONMENT
Walter M. Hollister *In* AGARD Mod. Display Technol. for Airborne Appl. Apr. 1983 16 p refs (For primary document see N83-30414 19-06)
Avail: NTIS HC A11/MF A01

The cockpit environment where modern display technology is applied is described. Six display devices are discussed. Applications are classified according to their visualization format. E.A.K.

N83-30417# Thomson-CSF, Boulogne-Billancourt (France). Div. des Tubes Electroniques.
CATHODE RAY TUBES
J. P. Michel *In* AGARD Mod. Display Technol. for Airborne Appl. Apr. 1983 36 p refs (For primary document see N83-30414 19-06)
Avail: NTIS HC A11/MF A01

The cathode ray tube (CRT) is one of the earliest electro-optical devices. The basic CRT is divided into four electro-optical regions, plus the screen itself: the electron beam formation region, the beam focusing region, and the drift region. The physical and visual characteristics are described. B.G.

N83-30418# Technische Hogeschool, Twente (Netherlands).
IMAGE GENERATION ON MATRIX DISPLAYS c06
D. Bosman *In* AGARD Mod. Display Technol. for Airborne Appl. Apr. 1983 17 p refs (For primary document see N83-30414 19-05)
Avail: NTIS HC A11/MF A01

Images are two dimensional distributions of luminance L(x,y) wherein x and y are the spatial (distance) coordinates of the local luminance L. The spatial resolution required for faithful reproduction of the image is determined by very steep luminance gradients and small radii curvature of contours, (at viewing distance seen at a solid angle of 0.5 minute) and by just noticeable L-differences (JND's) in low gradients. The required luminance resolution is determined by discernible luminance contrasts (3%). The performance and its limits of the CRT as used in both the recreational sector (television) and professional applications (such as aircraft displays), were extensively researched and described. The new generation of flat panel display devices have image generation properties which are sufficiently different from those of the CRT to require additional ergonomic investigations. In particular, the structural information (spatial domain) does not allow such operations as analogue low pass filtering based on partial overlap of pixels: the image remains tesselated because of the display technologies involved, wherein pixels are formed by reticulation of the light modulating or emitting display surface. Author

N83-30419# Marconi Avionics Ltd., Boreham Wood (England).
LIGHT EMITTING DIODES
D. Price and K. T. Burnette (Bunker Ramo Corp.) *In* AGARD Mod. Display Technol. for Airborne Appl. Apr. 1983 24 p refs (For primary document see N83-30414 19-06)
Avail: NTIS HC A11/MF A01

The evolution of Light Emitting Diodes (LEDs) as a result of the initial search for materials suitable for the formation of improved quality diodes and transistors are reviewed. Any semiconductor having an energy band gap wide enough to support a visible radiative recombination process is a potential candidate for the fabrication of LEDs. Materials used successfully for the formation of light emitting diodes include SiC, a compound of Chemical Group 4 elements, several Group 3-5 compounds and several Group 2-6 compounds. Extreme difficulties experienced in forming pn diode junctions within Group 2-6 compounds resulted in the development of a metal-insulator-semiconductor electron injection structure that to data was in general characterized by relatively low light emission efficiencies. Light emitting diodes are being successfully applied to airborne numeric and alphanumeric display tasks with more sophisticated graphics displays designed for aircraft installation nearing completion. Author

N83-30420# Royal Signals and Radar Establishment, Malvern (England).
LIQUID CRYSTAL DISPLAYS
A. J. Hughes *In* AGARD Mod. Display Technol. for Airborne Appl. Apr. 1983 17 p refs (For primary document see N83-30414 19-06)
Avail: NTIS HC A11/MF A01

Although liquid crystalline materials were recognized for over 100 years, their potential in display devices has become apparent only during the last 15 years. In this time many different effects were dicovered and assessed in laboratories, commercial exploitation was rapid and extensive, and a few displays were already fully developed for military use. The physical properties of liquid crystal materials and a selection of the more significant effects exploited in displays, pointing out their relative advantages and limitations is described. The present state of the art is summarized and some tentative predictions for future performance are made. Author

N83-30421# Army Avionics Research and Development Activity, Fort Monmouth, N. J.
ELECTROLUMINESCENT DISPLAYS
B. Gurman *In* AGARD Mod. Display Technol. for Airborne Appl. Apr. 1983 31 p refs (For primary document see N83-30414 19-06)
Avail: NTIS HC A11/MF A01

The principles of operation and physical/visual characteristics of electroluminescent displays are reviewed. The state-of-the-art in ac and dc, powder and thin film electroluminescent devices is described. M.G.

N83-30422# Thomson-CSF, Boulogne-Billancourt (France). Div. des Tubes Electroniques.
VACUUM FLUORESCENT TUBES
J. P. Michel *In* AGARD Mod. Display Technol. for Airborne Appl. Apr. 1983 8 p refs (For primary document see N83-30414 19-06)
Avail: NTIS HC A11/MF A01

The historical development and current state-of-the-art of vacuum fluorescent tubes is reviewed. The principles of operation, physical/visual characteristics, addressing/driving, and system interface are discussed. M.G.

N83-30423# Thomson-CSF, Boulogne-Billancourt (France). Div. des Tubes Electroniques.
LARGE AREA GAS DISCHARGE DISPLAYS OR PLASMA DISPLAYS
J. P. Michel *In* AGARD Mod. Display Technol. for Airborne Appl. Apr. 1983 17 p refs (For primary document see N83-30414 19-06)
Avail: NTIS HC A11/MF A01

Operating principles, physical and visual characteristics, addressing and driving, and system interface of both ac and dc plasma displays are discussed. The state of development and primary applications are also reviewed. M.G.

N83-30424# Royal Signals and Radar Establishment, Malvern (England).
OTHER TYPES OF DISPLAY
A. J. Hughes *In* AGARD Mod. Display Technol. for Airborne Appl. Apr. 1983 12 p refs (For primary document see N83-30414 19-06)
Avail: NTIS HC A11/MF A01

A selection of newer and less well advanced display technologies that need further development before commercial or military acceptance are discussed are all non-emissive and include magnetooptic, magnetic particle, electrochemical, and various electro-mechanical displays. The properties and limitations of these various techniques are reviewed and compared with those of more established liquid crystal displays. R.J.F.

N83-30425# Royal Aircraft Establishment, Farnborough (England).
OPTICAL TECHNIQUES FOR AIRBORNE DISPLAYS
Geoffrey H. Hunt *In* AGARD Mod. Display Technol. for Airborne Appl. Apr. 1983 12 p refs (For primary document see N83-30414 19-06)
Avail: NTIS HC A11/MF A01

Different types of optical designs used in airborne electronic displays are discussed in broad terms. The design constraints of each are noted. Optical filters, biocular magnifying displays, head-up displays, diffractive-optic displays, and multicolor displays are discussed. R.J.F.

N83-30426# Massachusetts Inst. of Tech., Cambridge. Dept. of Aeronautics and Astronautics.
APPLICATIONS
Walter M. Hollister *In* AGARD Mod. Display Technol. for Airborne Appl. Apr. 1983 9 p (For primary document see N83-30414 19-06)
Avail: NTIS HC A11/MF A01

Relative comparisons are made among various competing display technologies. Performance measures selected for comparison are summarized. Comparisons are made with regard to luminous intensity, reflectance, contrast, color, and resolution. Advantages and disadvantages are listed. An assessment of the potential of each technology for each application is summarized. R.J.F.

N83-31177 Syracuse Research Corp., N. Y.
MODELLING OF DIRECT-STRIKE LIGHTNING COUPLING BY A TRANSFER FUNCTION TECHNIQUE
D. T. Auckland, R. F. Wallenberg (Naval Air Systems Command), and J. A. Birken *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 9 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31188 Southwest Research Inst., San Antonio, Tex.
ELECTROSTATIC VOLTAGE SENSORS FOR HELICOPTER DISCHARGERS
Oren Tranbarger and Bob M. Duff *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 34 p refs (For primary document see N83-31163 19-47)
(Contract DAAK51-79-C-0060)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N83-30427*# United Technologies Corp., East Hartford, Conn. Commercial Products Div.
ENERGY EFFICIENT ENGINE LOW-PRESSURE COMPRESSOR COMPONENT TEST HARDWARE DETAILED DESIGN REPORT
C. J. Michael and J. E. Halle Jun. 1981 80 p refs
(Contract NAS3-20646)
(NASA-CR-165354; NAS 1.26:165354; PWA-5594-157) Avail: NTIS HC A05/MF A01 CSCL 01E

The aerodynamic and mechanical design description of the low pressure compressor component of the Energy Efficient Engine were used. The component was designed to meet the requirements of the Flight Propulsion System while maintaining a low cost approach in providing a low pressure compressor design for the Integrated Core/Low Spool test required in the Energy Efficient Engine Program. The resulting low pressure compressor component design meets or exceeds all design goals with the exception of surge margin. In addition, the expense of hardware fabrication for the Integrated Core/Low Spool test has been minimized through the use of existing minor part hardware. Author

N83-30428*# Bionetics Corp., Hampton, Va.
AERODYNAMIC EVALUATION OF CIRCULATION CONTROL PROPELLERS
Albert L. Braslow Jun. 1981 72 p refs
(Contract NAS1-14970)
(NASA-CR-165748; NAS 1.26:165748) Avail: NTIS HC A04/MF A01 CSCL 01A

The aerodynamic compatibility of fixed-pitch circulation-control (CC) propellers with the performance characteristics and requirements of a 1600 kg (3600 lb) single-engine variable-pitch propeller general aviation airplane was evaluated. The initial results with elliptical-shaped CC airfoils indicated that the feasibility of application to fixed-pitch propellers was doubtful for the class of airplane investigated (cruise speed of about 300 km/hr) and improbable for higher-speed airplanes. Supplemental data for a cambered circulation-control supercritical airfoil, which became available after

completion of the initial evaluation, were subsequently analyzed and are included in the Addendum to this report. With the much superior aerodynamic characteristics of the CC-supercritical airfoil, elimination of variable pitch appears aerodynamically feasible for low-speed airplanes through the use of a moderate amount of upper-surface blowing near the trailing edge during cruise. Overall feasibility depends upon results of structural and systems-type analyses. Author

N83-30429*# Pratt and Whitney Aircraft Group, East Hartford, Conn.
ENERGY EFFICIENT ENGINE HIGH-PRESSURE TURBINE SINGLE CRYSTAL VANE AND BLADE FABRICATION TECHNOLOGY REPORT
Anthony F. Giamei, Richard W. Salkeld, and Charles W. Hayes Jul. 1981 112 p refs
(Contract NAS3-20646)
(NASA-CR-165400; NAS 1.26:165400; PWA-5594-152) Avail: NTIS HC A02/MF A01 CSCL 21E

The objective of the High-Pressure Turbine Fabrication Program was to demonstrate the application and feasibility of Pratt & Whitney Aircraft-developed two-piece, single crystal casting and bonding technology on the turbine blade and vane configurations required for the high-pressure turbine in the Energy Efficient Engine. During the first phase of the program, casting feasibility was demonstrated. Several blade and vane halves were made for the bonding trials, plus solid blades and vanes were successfully cast for materials evaluation tests. Specimens exhibited the required microstructure and chemical composition. Bonding feasibility was demonstrated in the second phase of the effort. Bonding yields of 75 percent for the vane and 30 percent for the blade were achieved, and methods for improving these yield percentages were identified. A bond process was established for PWA 1480 single crystal material which incorporated a transient liquid phase interlayer. Bond properties were substantiated and sensitivities determined. Tooling die materials were identified, and an advanced differential thermal expansion tooling concept was incorporated into the bond process. Author

N83-30430*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio. Aircraft Engine Business Group.
ENERGY EFFICIENT ENGINE. CORE ENGINE BEARINGS, DRIVES AND CONFIGURATION: DETAILED DESIGN REPORT
C. L. Broman Jun. 1981 61 p refs
(Contract NAS3-20643)
(NASA-CR-165376; NAS 1.26:165376; R81-AEG-307) Avail: NTIS HC A04/MF A01 CSCL 21E

The detailed design of the forward and aft sumps, the accessory drive system, the lubrication system, and the piping/manifold configuration to be employed in the core engine test of the Energy Efficient Engine is addressed. The design goals for the above components were established based on the requirements of the test cell engine. Author

N83-30431*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
INCIDENCE LOSS FOR FAN TURBINE ROTOR BLADE IN TWO-DIMENSIONAL CASCADE
John F. Kline, Thomas P. Moffitt, and Roy G. Stabe Jul. 1983 11 p refs
(NASA-TP-2188; E-1587; NAS 1.60:2188) Avail: NTIS HC A02/MF A01 CSCL 21E

The effect of incidence angle on the aerodynamic performance of a fan turbine rotor blade was investigated experimentally in a two dimensional cascade. The test covered a range of incidence angles from -15 deg to 10 deg and exit ideal critical velocity ratios from 0.75 to 0.95. The principal measurements were blade-surface static pressures and cross-channel survey of exit total pressure, static pressure, and flow angle. Flow adjacent to surfaces was examined using a visualization technique. The results of the investigation include blade-surface velocity distribution and overall kinetic energy loss coefficients for the incidence angles and exit velocity ratios tested. The measured losses are compared with those from a reference core turbine rotor blade and also with two common analytical methods of predicting incidence loss. Author

N83-30432*# Garrett Turbine Engine Co., Phoenix, Ariz.
SCALED CENTRIFUGAL COMPRESSOR, COLLECTOR AND RUNNING GEAR PROGRAM Final Report
J. G. Kenehan 31 Mar. 1983 97 p refs
(Contract NAS3-22431)
(NASA-CR-168167; NAS 1.26:168167; GR-21-4269) Avail: NTIS HC A05/MF A01 CSCL 21E

The Scaled Centrifugal Compressor, Collector and Running gear Program was conducted in support of an overall NASA strategy to improve small-compressor performance, durability, and reliability while reducing initial and life-cycle costs. Accordingly, Garrett designed and provided a test rig, gearbox coupling, and facility collector for a new NASA facility, and provided a scaled model of an existing, high-performance impeller for evaluation scaling effects on aerodynamic performance and for obtaining other performance data. Test-rig shafting was designed to operate smoothly throughout a speed range up to 60,000 rpm. Pressurized components were designed to operate at pressures up to 300 psia and at temperatures to 1000 F. Nonrotating components were designed to provide a margin-of-safety of 0.05 or greater; rotating components, for a margin-of-safety based on allowable yield and ultimate strengths. Design activities were supported by complete design analysis, and the finished hardware was subjected to check-runs to confirm proper operation. The test rig will support a wide range of compressor tests and evaluations. Author

N83-30433# Naval Research Lab., Washington, D. C. Inorganic and Electrochemistry Branch.
HOT CORROSION IN GAS TURBINES Interim Report
R. L. Jones 27 Apr. 1983 26 p refs
(AD-A127425; NRL-MR-5070) Avail: NTIS HC A03/MF A01 CSCL 21/5

A review is presented which gives a brief, largely chronological overview of the development of the different theories of hot corrosion. This review was the Keynote Lecture for the Gas Turbine Session of the Symposium on Corrosion in Fossil Fuel Systems, Electrochemical Society Meeting, Detroit, MI, October 1982. Author (GRA)

N83-30434# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Gruppe Gesamtsysteme.
COMPARISON OF A PROPFAN/TURBOFAN ENGINE BY THERMODYNAMIC CYCLE CALCULATIONS
Peter Schimming Nov. 1982 47 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-820)
(DFVLR-Mitt-82-18; ESA-TT-820) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 16,80

Thermodynamic cycle calculations were done for a propfan and turbofan propulsion system for a twin engine, medium range transportation aircraft to show the differences in specific fuel consumption. Common definitions for the efficiencies of propeller and fan and common handling in one cycle program were used. Results show 15% to 20% specific fuel consumption improvement, which depends on the mastering of interference between propeller stream and bearing surface. Author (ESA)

N83-30689# Franklin Research Center, Philadelphia, Pa.
MODAL ANALYSIS AS A TOOL IN THE EVALUATION OF A TURBINE WHEEL FAILURE
Anthony L. Moffa and Robert L. Leon *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 1 May 1982 p 101-123 refs (For primary document see N83-30684 19-31)
Avail: NTIS HC A07/MF A01 CSCL 21/5

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N83-30435*# Pratt and Whitney Aircraft Group, East Hartford, Conn. Commercial Products Div.
SUBSONIC-TRANSONIC STALL FLUTTER STUDY Final Report
H. Stardter Jun. 1979 311 p refs
(Contract NAS3-20606)
(NASA-CR-165256; NAS 1.26:165256; PWA-5517-31) Avail: NTIS HC A14/MF A01 CSCL 01C

The objective of the Subsonic/Transonic Stall Flutter Program was to obtain detailed measurements of both the steady and unsteady flow field surrounding a rotor and the mechanical state of the rotor while it was operating in both steady and flutter modes to provide a basis for future analysis and for development of theories describing the flutter phenomenon. The program revealed that while all blades flutter at the same frequency, they do not flutter at the same amplitude, and their interblade phase angles are not equal. Such a pattern represents the superposition of a number of rotating nodal diameter patterns, each characterized by a different amplitude and different phase indexing, but each rotating at a speed that results in the same flutter frequency as seen in the rotor system. Review of the steady pressure contours indicated that flutter may alter the blade passage pressure distribution. The unsteady pressure amplitude contour maps reveal regions of high unsteady pressure amplitudes near the leading edge, lower amplitudes near the trailing. Author

N83-30370# Royal Aircraft Establishment, Bedford (England). Aerodynamics Dept.
SOME MEASUREMENTS OF BUFFETING ON A FLUTTER MODEL OF A TYPICAL STRIKE AIRCRAFT
D. G. Mabey and B. E. Cripps *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 16 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

N83-30374# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. fuer Flugmechanik.
CORRELATION ASPECTS IN THE IDENTIFICATION OF DYNAMIC EFFECTS USING COMPLEMENTARY TECHNIQUES FLIGHT IN TURBULENCE: GUST ALLEVIATION
K. Welhelm and R. Verbrugge (Inst. de Mecanique des Fluides) *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 22 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

N83-30375# Institut de Mecanique des Fluides de Lille (France).
ASPECTS OF CORRELATION IN THE IDENTIFICATION OF DYNAMIC EFFECTS FROM COMPLIMENTARY TECHNIQUES: EVOLUTION AT HIGH ANGLES [ASPECTS DE LA CORRELATION DANS L'IDENTIFICATION D'EFFECTS DYNAMIQUES A PARTIR DE TECHNIQUES COMPLEMENTAIRES EVOLUTION AUX GRANDS ANGLES]
D. Tristrant *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 21 p refs In FRENCH; ENGLISH summary (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

N83-30376# Army Aviation Research and Development Command, Moffett Field, Calif. Aeromechanics Lab.
DYNAMIC STRUCTURAL AEROELASTIC STABILITY TESTING OF THE XV-15 TILT ROTOR RESEARCH AIRCRAFT
L. G. Schroers *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 18 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

N83-30379# Aeritalia S.p.A., Torino (Italy). Bruppo Velivoli da Combattimento.
CORRELATION PROBLEMS BETWEEN FLUTTER FLIGHT TEST DATA AND GROUND TESTS/CALCULATION RESULTS FOR A VARIABLE SWEEP WING AIRCRAFT
G. DeFerrari, A. Lotze (MBB), and R. Pyrah (British Aerospace Aircraft Group) *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 17 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

N83-30380*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
REAL-TIME FLUTTER ANALYSIS OF AN ACTIVE FLUTTER-SUPPRESSION SYSTEM ON A REMOTELY PILOTED RESEARCH AIRCRAFT
Glenn B. Gilyard and John W. Edwards *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 15 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01 CSCL 01C

N83-30381# Vereinigte Flugtechnische Werke-Fokker G.m.b.H., Bremen (West Germany).
FLIGHT FLUTTER TESTING WITH EMPHASIS ON THE TIP VANE METHOD
Helmut Zimmemann and Roger Destuynder (ONERA) *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 14 p refs Previously announced as A83-18435 (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

N83-30718# North Carolina State Univ., Raleigh. Dept. of Mechanical and Aerospace Engineering.
SUBCRITICAL FLUTTER TESTING USING THE FEEDBACK SYSTEM APPROACH
C. D. Turner *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 3 May 1982 p 145-157 refs (For primary document see N83-30709 19-31)
Avail: NTIS HC A12/MF A01 CSCL 01/3

N83-30721# Indian Space Research Organization, Trivandrum. Aerospace Structures Div.
SLV-3 FLIGHT VIBRATION ENVIRONMENT
S. A. Palaniswami, G. Muthuraman, and P. Balachandran *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 3 May 1982 p 249-263 refs (For primary document see N83-30709 19-31)
Avail: NTIS HC A12/MF A01 CSCL 01/3

N83-31234 British Aerospace Public Ltd. Co., Lancashire (England).
LIGHTNING PROTECTION DESIGN AND LIGHTNING THREAT FLIGHT CLEARANCE OF A FLY-BY-WIRE FLIGHT CONTROL SYSTEM FOR AN UNSTABLE AIRCRAFT
P. A. Doggett and I. P. MacDiarmid *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 10 p ref (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N83-30436# Canada Inst. for Scientific and Technical Information, Ottawa (Ontario).

CONSTRUCTION OF AN ICE MODEL BASIN AT THE SHIP RESEARCH INSTITUTE OF THE MINISTRY OF TRANSPORTATION

Koji Kamura and Motoichi Takeuchi 1983 45 p Transl. into ENGLISH of rept. no. 114 Mitsui Shipbuilding Co., Inc., (Japan) p 91-102

(NRC/CNR-TT-2066; ISSN-0077-5606) Avail: NTIS HC A03/MF A01

A water tank designed to artificially reproduce icy sea conditions was built. This ice model test basin was constructed in an insulated building and a cooling system was installed to make the water in the tank freeze at its surface. Special consideration was given to the basic design and insulation of the building and the basin so as to ensure that they could withstand rapid and repeated temperature changes. Author

N83-30437# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

SUPERSONIC NOZZLE DESIGN FOR A LOW DENSITY WIND TUNNEL

Ronaldo Bologna Abrao and Nellore S. Venkataraman May 1983 13 p refs To be presented at the 7th Congr. Brasil. de Eng. Mecan., Uberlandia, Brazil, 13-16 Dec. 1983

(INPE-2753-PRE/329) Avail: NTIS HC A02/MF A01

A method to determine the contour of an axisymmetric nozzle of a low density wind tunnel, to produce a supersonic, parallel and uniform flow in the test section is described. The method of characteristics is used to obtain the isentropic profile which is then corrected for boundary layer growth. The influence of the nozzle geometry on the flow parameters is analyzed. Author

N83-30438*# National Aeronautics and Space Administration, Washington, D. C.

WEATHER HAZARD SIMULATION IN THE MODANE WIND-TUNNELS

Guy Fasso, Guy Leclere, and Francois Charpin Apr. 1983 20 p refs Transl. into ENGLISH of "Simulation des Intemperies dans les Souffleries de Modane" rept. AGARD-CP-174 Paris, Mar. 1976 8 p Fluid Dyn. Panel Symp. held in London, 6-8 Oct. 1975 Document was also announced as N76-25244 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-3541)

(NASA-TM-77069; NAS 1.15:77069; AGARD-CP-174) Avail: NTIS HC A02/MF A01 CSCL 14B

Specially designed wind tunnel setups make it possible to simulate various weather hazards, in an imperfect but systematic manner. Systems installed in the Modane wind tunnels for rain and icing tests are described. A qust simulator being developed is also discussed. Author

N83-30439*# National Aeronautics and Space Administration, Washington, D. C.

CONVERGENCE BEHAVIOR THAT CONTROLS ADAPTIVE WIND TUNNEL WALLS NEAR THE TEST SECTION IN THE HIGH ANGLE OF ATTACK RANGE

Jonny Ziemann Nov. 1982 80 p refs Transl. into ENGLISH of "Das Konvergenzverhalten der Regelung Adaptiver Windkanalwande bei Profiluntersuchunger im Hochanstellwinkel-Bereich" rept. ILR-Mitt-66-(1980) Technische Universitaet, Berlin, Jan. 1980 p 1-76 Transl. by Scientific Translation Service, Santa Barbara, Calif.

(Contract NASw-3542)

(NASA-TM-77006; NAS 1.15:77006; ILR-Mitt-66-(1980)) Avail: NTIS HC A05/MF A01 CSCL 14B

The NACA 0012 profile at Mach 0.5 was investigated in a wind tunnel with adaptive walls. It is found that adaptation of the flexible walls is possible in the high angle of attack range on both sides of maximum lift. Oil film photographs of the flow at the profile surface show three dimensional effects in the region of the corners between the profile and the sidewall. It is concluded that pure two dimensional separated flow is not possible. Author

N83-30440# BDM Corp., McLean, Va.

RAPID RUNWAY REPAIR PROGRAM SUBTASK 1.08. CONCRETE CUTTING EQUIPMENT EVALUATION Final Report, Jul. 1981 - Sep. 1982

R. K. Moats, R. Duchatellier, and B. N. Thakur Tyndall AFB, Fla. Air Force Engineering and Service Center 1 Mar. 1983 85 p

(Contract F08635-80-C-0206; AF Proj. 2104)

(AD-A127336; AFESC/ESL-TR-82-40; BDM/W-82-505-TR) Avail: NTIS HC A05/MF A01 CSCL 13/9

Diamond saws were identified in earlier studies as a promising technology for cutting concrete for bomb damage repair efforts. Diamond saw blade design parameters (metal bond; diamond type, concentration, and mesh size) were investigated to develop an optimum rapid cutting blade. Blade performance was measured in terms of cutting rate, power requirement and wear performance. Cutting rates as high as 4 sq. ft. min for a 7-inch deep cut were achieved requiring 34 horsepower. At these high cutting rates, the 24-inch diamond saw blades developed gullet cracks. Data from the test program is interpreted regarding the feasibility of several possible diamond saw systems for obtaining cutting rates of 20 sq. ft. min. Author (GRA)

N83-30441# Sperry Systems Management, Huntsville, Ala.

DESIGN, FABRICATION AND TEST OF AN INTEGRATED BUILT-IN-TEST (BIT) CONTROL UNIT Final Report

Thomas R. Hoop and Edwin K. Thomas Oct. 1982 45 p

(Contract DAAH01-81-D-A012)

(AD-A127278; AD-E950376; DRSMI/RL-CR-83-1) Avail: NTIS HC A03/MF A01 CSCL 14/2

This report describes the design of an integrated Built-In-Test (BIT) control unit which may be interfaced with selected missile control subsystems. The control unit design provides the capability to perform tests of the subsystem operational integrity at time of turn-on and continually monitors system operation. In addition, the control unit design provides the capability to perform limited fault diagnosis and isolation to a replaceable assembly. The control unit design provides both a visual display and voice output to alert the operator of a detected malfunction. GRA

N83-30442# Mitre Corp., McLean, Va. Metrek Div.

SOFTWARE DESCRIPTION FOR THE O'HARE RUNWAY CONFIGURATION MANAGEMENT SYSTEM. VOLUME 1: TECHNICAL DESCRIPTION

Sadegh Kavoussi Oct. 1982 269 p refs 2 Vol.

(Contract DTFA01-81-C-10003)

(AD-A127398; FAA-EM-82-28-Vol-1; MTR-82W125-Vol-1) Avail: NTIS HC A12/MF A01 CSCL 01/5

This document describes the software developed as part of the Chicago O'Hare Runway Configuration Management System (CMS). The software is designed as an interactive automated planning aid to assist the O'Hare assistant chief in the consistent selection of efficient runway configurations in order to lower aircraft delays. In addition, CMS serves as an information management system by consolidating various airport data and making them available for the O'Hare facility personnel. Volume 1 of this document contains the general description of the CMS software plus high level pseudocodes describing its logic. Volume 2 is dedicated to detailed description of the software via low level pseudocodes. Author (GRA)

N83-30443# Mason and Hanger-Silas Mason Co., Inc., Amarillo, Tex.

VELOCITY PERTURBATION OF A FLYER APPROACHING A RIGID IMPERMEABLE BARRIER AND THE TRANSMITTED PRESSURE PULSE

Thomas O. Meyer Mar. 1983 40 p refs

(Contract DE-AC04-76DP-00487)

(DE83-007770; MHSMP-83-10; PDE-101) Avail: NTIS HC A03/MF A01

The velocity of an electrically-driven Kapton flyer is measured

with VISAR as it travels the length of a barrel closed by a clear PMMA window. Velocity perturbation effects (principally that of air compression) are evident. Flyers with a velocity comparable to those viewed through the clear window impact an aluminized window of PMMA. The particle velocity at the interface is measured with VISAR. Good correlation is found for the flyer velocity just after impact from clear PMMA window shots and the peak particle velocity of the aluminized PMMA interface. Current VISAR capabilities at Pantex are discussed. DOE

N83-30774# Wyle Labs., Inc., Colorado Springs, Colo.
THE VIBRATION TEST UNIT, A UNIQUE RAIL VEHICLE VIBRATION TEST FACILITY
R. O. Coupland and A. J. Nintzel *In* Shock and Vibration Information Center The Shock and Vibration Bull., no. 50, part 2 Sep. 1980 p 217-228 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 14B

N83-31213 Sandia Labs., Albuquerque, N. Mex.
FULL-SYSTEM TESTS USING THE SANDIA LIGHTNING SIMULATOR
Robert A. White *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 17 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31223 McDonnell Aircraft Co., St. Louis, Mo.
UPDATING THE MCAIR LIGHTNING SIMULATION LABORATORY
E. H. Schulte *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 9 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-30372*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
HELICOPTER SIMULATION VALIDATION USING FLIGHT DATA
David L. Key (Army Research and Technology Labs.), Raymond S. Hansen (Army Research and Technology Labs.), William B. Cleveland, and William Y. Abbott (Army Aviation Engineering Flight Activity) *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 13 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01 CSCL 14B

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N83-30444# Joint Publications Research Service, Arlington, Va.
USSR REPORT: SPACE, NO. 19
31 Jan. 1983 104 p Transl. into ENGLISH from various Russian articles
(JPRS-82771) Avail: NTIS HC A06

This serial report contains news items, abstracts and articles of scientific reports on all aspects of the Soviet space program, including manned-mission highlights, space sciences, interplanetary research, space biology and medicine, space engineering, applications (satellite geodesy, meteorology, communications, remote sensing), and space science policy and space science policy and administration. For individual titles, see N83-30445 through N83-30464.

N83-30445# Joint Publications Research Service, Arlington, Va.
MATERIAL PROCESSING EXPERIMENTS ON SALYUT-7
B. Konovalov *In its* USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 1-2 Transl. into ENGLISH from Izv. (Moscow), 1 Jul. 1982 p 2 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

The production of valuable materials in orbit is one of the most promising trends in the development of cosmonautics. It may lead eventually to the establishment of orbital shops and factories for production of materials which are very difficult or simply impossible to create under Earth conditions. But the path to these space plants of the future is a difficult one and hides much that is unexpected. Extensive and comprehensive research is required. The aim of the Kalibrovka experiment is to obtain data for building a mathematical model for thermal processes that take place in the electrical heating furnace under the conditions of microgravitation which actually exist on board the station. It entails detailed measurements of thermal fields in the furnace for various operating conditions while simultaneously recording the accelerations occurring at the orbital station. Author

N83-30446# Joint Publications Research Service, Arlington, Va.
EXPERIMENTS WITH ELECTRIC FURNACE ON SALYUT-7
A. Pokrovskiy *In its* USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 3-4 Transl. into ENGLISH from Pravda (Moscow), 29 Jun. 1982 p 3 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

Production technology consists of three stages -- discovery, experimentation, and study of its potential and implementation. On Salyut-7 an electric furnace was used to melt lead and copper polycrystals in liquid copper. The speed at which this took place was measured. An on-board computer recorded all the data obtained, and then transmitted it to Earth for subsequent analysis. Author

N83-30447# Joint Publications Research Service, Arlington, Va.
BIOMEDICAL AND TECHNICAL EXPERIMENTS ON SALYUT-7
A. Pokrovskiy *In its* USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 5-6 Transl. into ENGLISH from Pravda (Moscow), 26 May 1982 p 3 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

Aerospace medicine and its biological effects were studied, using both the cosmonauts and plants as subjects. No irreversible changes in functions were detected, however the plants were used to detect genetic and cellular changes. Author

N83-30448# Joint Publications Research Service, Arlington, Va.
BRASLET, POZA AND EKHOGRAFIYA EXPERIMENTS ON SALYUT-7
V. Gubarev *In its* USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 7-9 Transl. into ENGLISH from Pravda (Moscow), 28 Jun. 1982 p 3 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

The effects of weightlessness on the body were examined. Blackout prevention was employed by use of cuffs and a Braslet on the legs. Intravehicular activity was carried out and filmed for study. B.G.

N83-30449# Joint Publications Research Service, Arlington, Va.
FURTHER COMMENTARY ON BIOMEDICAL STUDIES BY SOYUZ T-6 CREW **c52**
B. Konovalov *In its* USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 10-12 Transl. into ENGLISH from Izv. (Moscow), 29 Jun. 1982 p 2 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

The interactions between the cosmonaut's sensory organs and his motor system during conditions of weightlessness were studied by a series of intravehicular activities. B.G.

N83-30450# Joint Publications Research Service, Arlington, Va.
TSITOS-2 AND BIOBLOK-3 EXPERIMENTS
A. Pokrovskiy *In its* USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 13-14 Transl. into ENGLISH from Pravda (Moscow), 1 Jul. 1982 p 6 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

The behavior of microorganisms in space was studied. The effect of antibiotics on the conditionally pathogenic microorganisms,

whose influence is felt when the human health condition deteriorates, was studied. Also conducted, was the Tsitos-2 experiment--photography of faintly luminous objects in space. B.G.

N83-30451# Joint Publications Research Service, Arlington, Va.
NEW FOOD SELECTION SYSTEM FOR COSMONAUTS IN SALYUT-7 **c54**
B. Konovalov *In its* USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 15-16 Transl. into ENGLISH from Izv. (Moscow), 3 Jun. 1982 p 6 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

The first test of an experiment system of food selection aboard the Salyut Space Station. The cosmonaut selects his meals within a caloric framework, sending the results for medical monitoring. Also a small refrigerator is now onboard, allowing leftovers to be eaten later, and cold liquids to be kept on hand. B.G.

N83-30452# Joint Publications Research Service, Arlington, Va.
PRESS CONFERENCE ON RESULTS OF SOVIET-FRENCH FLIGHT
In its USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 17-20 Transl. into ENGLISH from Izv. (Moscow), 8 Jul. 1982 p 3 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

Fourteen different experiments in the fields of space biology and medicine, astrophysics, geophysics and the study of materials were prepared by Soviet and French specialists. One of the first signs of this cooperation was the experiments conducted during a joint study of our planet's magnetic field at coupled magnetic points on Earth. During all this time, about 40 large scale joint programs were carried out. Author

N83-30453# Joint Publications Research Service, Arlington, Va.
X-RAY ASTRONOMY RESEARCH ON SALYUT-7 **c89**
B. Konovalov *In its* USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 21-22 Transl. into ENGLISH from Izv. (Moscow), 24 Jul. 1982 p 2 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

Astronomical observations of the electromagnetic radiation spectrum are examined by means of an RT-4M mirror X-ray telescope aboard the Salyut Space Station. B.G.

N83-30454# Joint Publications Research Service, Arlington, Va.
RYUMIN INTERVIEWED ON WORK OF COSMONAUTS, FLIGHT CONTROLLERS
Rimma Kornaushenko *In its* USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 23-28 Transl. into ENGLISH from Ogonek (Moscow), no. 40, 2 Oct. 1982 p 16-17 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

The role of the cosmonaut in experiment management is discussed. The need for breakdown of the experiment into deliberately elementary parts, that someone with only a small amount of preflight experience could run, is examined, and the importance of inventory and cross checking was discussed. B.G.

N83-30455# Joint Publications Research Service, Arlington, Va.
CHRONOLOGY OF SALYUT-7 FLIGHT
In its USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 29-36 Transl. into ENGLISH from various Tass news releases (USSR), 1982 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

Information on activities during the flight of Salyut-7 space station are reported. The program included: docking of Salyut-7 and Soyuz T-5; astrophysical and technical experiments; Earth observation and photography; and biomedical research and experiments. E.A.K.

N83-30456# Joint Publications Research Service, Arlington, Va.
TELEVISION ON VENUS **c91**
A. S. Selivanov and M. K. Narayeva *In its* USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 40-43 Transl. into ENGLISH from Zemlya i Vselennaya (Moscow), no. 4, Jul. - Aug. 1982 p 4-6 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

Landing vehicles from the Venera-13 and Venera-14 stations made a soft landing on Venus on 1 and 5 March 1982, and black and white and color portraits of Venus were sent back to Earth. Interpretation of the telephotometry is discussed. E.A.K.

N83-30457# Joint Publications Research Service, Arlington, Va.
UNIFIED THEORY OF MOTION OF INNER PLANETS **c90**
V. Kotelnikov and M. Kislik *In its* USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 44-47 Transl. into ENGLISH from Izv. (Moscow), 1 May 1982 p 3 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

A highly accurate, unified theory of motion for the Solar System's inner planets Mercury, Venus, the Earth, Mars was developed. It has practical importance and is used to solve various problems of interplanetary cosmonautics. E.A.K.

N83-30458# Joint Publications Research Service, Arlington, Va.
FURTHER COMMENTARY ON BOTANICAL EXPERIMENTS ON SALYUT-7
A. Pokrovskiy *In its* USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 53-54 Transl. into ENGLISH from Pravda (Moscow), 17 Jun. 1982 p 3 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

Biological experiments on Salyut-7 were compared to those done on Soyuz-13, 9 years earlier. The original biological experiments investigated the vital activities of microorganisms in weightless environments, while the Salyut is equipped with a variety of biological installations which serve many different purposes. The direction of biological experiments is defined, which is to determine the special features of the development of living organisms under unusual conditions and to search for ways to make practical use of plants and microorgamisms in a near Earth orbit. E.A.K.

N83-30459# Joint Publications Research Service, Arlington, Va.
FRAGMENT SPACE SYSTEM FOR NATURAL RESOURCE STUDY **c43**
G. A. Avanesov and Ya. L. Ziman *In its* USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 55-63 Transl. into ENGLISH from Zemlya i Vselennaya (Moscow), no. 4, Jul. - Aug. 1982 p 6-12 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

The fragment equipment, carried aboard the Meteor satellite, was developed for investigation of the Earth's natural resources in the optical waveband. The orbit of the satellite, approximately 650 km high, allows the same areas on the ground to be seen at the same time of day once every 15 days. E.A.K.

N83-30460# Joint Publications Research Service, Arlington, Va.
KOSPAS-SARSAT SATELLITE RESCUE SYSTEM **c15**
Yu. Zubarov *In its* USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 64-66 Transl. into ENGLISH from Pravda (Moscow), 6 Aug. 1982 p 3 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

The Cosmos-1383 artificial Earth satellite was launched. It carries equipment that will be used as part of a system to determine the location of ships and aircraft in distress. This equipment was created and launched into a near Earth orbit in accordance with the plan for the realization of the international KOSPAS-SARSAT project, which is developed jointly by specialists from the the USSR, the United States, Canada and France. The system's effectiveness will be evaluated. E.A.K.

N83-30461# Joint Publications Research Service, Arlington, Va.
COMMUNICATION SATELLITE SYSTEMS **c15**
G. Markelov and M. Fedorov *In its* USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 67-69 Transl. into ENGLISH from Pravda (Moscow), 3 May 1982 p 3 Translation was announced as N83-71929 (For primary document see N83-30444 19-12)

Avail: NTIS HC A06

Cosmonautics is having a huge effect on different areas of science and the national economy and its effect on information reception and transmission facilities is particularly profound. Communication links utilizing artificial Earth satellites have become a fundamentally new factor. A satellite receives radio signals from a ground station and retransmits them, with or without preliminary amplification, to another station. It is found that it is possible to operate simultaneously, through a single satellite, a considerable number of stations that are far removed from each other. E.A.K.

N83-30462# Joint Publications Research Service, Arlington, Va.
GEOLOGICAL OBSERVATIONS BY SALYUT-7 COSMONAUTS c46

A. Pokrovskiy *In its* USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 70-72 Transl. into ENGLISH from Pravda (Moscow), 10 Jun. 1982 p 6 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

Geological structural analyses from the Salyut-7 space station are reported. The existence of structures which was not clear in previous photography was confirmed. The boundaries of the astrakhan arch were observed and the left bank continuation of the arch could be distinguished. E.A.K.

N83-30463# Joint Publications Research Service, Arlington, Va.
RESULTS OF UN SPACE CONFERENCE DISCUSSED

Yu. Kolosov *In its* USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 79-81 Transl. into ENGLISH from Izv. (Moscow), 6 Sep. 1982 p 5 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

The second UN Conference on the Research and Use of Space for Peaceful Purposes held in Vienna 9 through 21 August is reported. The worlds content of the report reflects the growing interest of the people in joint scientific space research and the utilization of the achievements of aeronautics for practical purposes. The need to continue the conquest of space for the benefit of the whole of mankind is emphasized. E.A.K.

N83-30464# Joint Publications Research Service, Arlington, Va.
KOTELNIKOV ON USSR-FRANCE COOPERATIVE SPACE PROGRAMS

V. Kotelnikov *In its* USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 82-84 Transl. into ENGLISH from Izv. (Moscow), 28 Jun. 1982 p 2 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

Cooperation between the USSR and France in studying and conquering space on an intergovernmental agreement, signed in Moscow in 1966 is discussed. The agreement provides for joint work in studying space, in the area of space meteorology, space communication via artificial Earth satellites and exchange of scientific information, postgraduate students and scientific delegations. Later, cooperation was extended to new areas: space biology and medicine, plus space material science. The joint Soviet-French research which was conducted in space encompasses practically all areas of contemporary space science. In conducting this research, scientists from the two countries are utilizing various resources of rocket and space technology: lunar and interplanetary automatic stations, artificial Earth satellites, manned orbital stations, research and meteorological rockets, high altitude drift balloons and flying laboratories, as well as ground resource such as radiotelescopes, special cameras and other instruments. E.A.K.

N83-30465*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PRESSURE DISTRIBUTIONS ON A 0.04-SCALE MODEL OF THE SPACE SHUTTLE ORBITER'S FORWARD FUSELAGE IN THE LANGLEY UNITARY PLAN WIND TUNNEL

Pamela F. Bradley, Paul M. Siemers, III, Paul F. Flanagan, and Martin W. Henry Mar. 1983 101 p
(NASA-TM-84628; NAS 1.15:84628) Avail: NTIS HC A06/MF A01 CSCL 22B

Pressure distribution tests on a 0.04-scale model of the forward fuselage of the Space Shuttle Orbiter are presented without analysis. The tests were completed in the Langley Unitary Plan Wind Tunnel (UPWT). The UPWT has two different test sections operating in the continuous mode. Each test section has its own Mach number range. The model was tested at angles of attack from -2.5 deg to 30 deg and angles of sideslip from -5 deg to 5 deg in both test sections. The test Reynolds number was 6.6 x 10 to the 6th power per meter. The tests were conducted in support of the development of the Shuttle Entry Air Data System (SEADS). In addition to modeling the 20 SEADS pressure orifices, the wind-tunnel model was also instrumented with orifices to match Development Flight Instrumentation (DFI) port locations currently existing on the Space Shuttle Orbiter Columbia (OV-102). This DFI simulation has provided a means for comparisons between reentry flight pressure data and wind-tunnel data. Author

N83-30466# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany).
DFVLR/ISRO COLLOQUIUM ABOUT A DECADE OF COOPERATION IN THE FIELD OF SPACE RESEARCH AND TECHNOLOGY

Jan. 1983 141 p refs Colloq. held in Bangalore, India, 27 Jan. 1982
(DFVLR-Mitt-83-03) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 35,20

Germano-Indian cooperation in remote sensing and communications (satellite-borne and airborne), plasma physics, and space projects was discussed. For individual titles, see N83-30467 through N83-30476.

N83-30467# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany).
THE DFVLR, GERMANY'S SPACE PROGRAM AND ITS COOPERATION WITH INDIA

H. Jordan *In its* DFVLR/ISRO Colloq. about a Decade of Cooperation in the Field of Space Res. and Technol. Jan. 1983 p 11-17 (For primary document see N83-30466 19-12)
Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 35,20

German space projects, including astronomy missions (the X-ray satellite ROSAT), a helium cooled infrared telescope GIRL to be flown on Spacelab; US-German Jupiter mission Galileo and the Active Magnetospheric Particle Explorer project of NASA are introduced. Germano-Indian cooperation on the Multispectral Electro-optical Stereo Scanner and Automatic Payload Control projects is mentioned. Author (ESA)

N83-30468# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
OVERVIEW OF INDO-GERMAN COLLABORATION IN THE AREA OF SPACE RESEARCH AND APPLICATIONS

H. Oettl, W. Mueller, and Y. S. Rajan (Indian Space Research Organization, Bangalore) *In its* DFVLR/ISRO Colloq. about a Decade of Cooperation in the Field of Space Res. and Technol. Jan. 1983 p 19-32 (For primary document see N83-30466 19-12)
Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 35,20

Indo-German research concerning materials and structures, rocket propulsion system test facilities, satellite technology, operation and mission planning, communication technology, remote sensing and Earth atmosphere is summarized. Training programs and technology transfer schemes are discussed. Author (ESA)

N83-30469# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
MULTISPECTRAL ELECTRO-OPTICAL STEREO SCANNER (MEOSS); AN EXPERIMENTAL CCD CAMERA FOR REMOTE SENSING c35

A. Drescher *In its* DFVLR/ISRO Colloq. about a Decade of Cooperation in the Field of Space Res. and Technol. Jan. 1983 p 35-66 refs (For primary document see N83-30466 19-12)
Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 35,20

The spectral dependence of the modulation transfer function of CCD cameras, angular dependence of spectral channels,

channel separation, scanline generation, and image rectification are discussed. A camera to be flown on a Rohini mission is described. Five CCD's are aligned parallel and at equal distances on a plate positioned in the focal plane of a metric quality objective. This plate is connected to a radiation cooler. Small strips of spectral filters are positioned in a common filter plate behind the optics immediately in front of the CCD's. The outer two and the central CCD build up the stereoscopic camera. They have identical spectral filters. The three central CCD's have different spectral channels. Spectral channels are the same as used in LANDSAT-MSS. Orbit height is 400 km; stereo base length = 300 to 400 km; swath width = 200 to 400 km; ground pixel = 70 to 150 m; height resolution = 70 to 200 m. Author (ESA)

N83-30470# Indian Space Research Organization, Bangalore.
A ROHINI 150 kg REMOTE SENSING MISSION c43
U. R. Rao, M. G. Chandrasekhar, and K. Kasturirangan *In* DFVLR DFVLR/ISRO Colloq. About a Decade of Cooperation in the Field of Space Res. and Technol. Jan. 1983 p 67-88 (For primary document see N83-30466 19-12)
Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 35,20

The effects on the satellite design of nonideal orbit characteristics for a multispectral scanner mission are discussed, and configurations employing skirt type solar panel deployment, two single-axis driven panels, and two two-axis driven panels are compared. Satellite structure, thermal control system, power supply, attitude control, stabilization, sensor, and data handling requirements are outlined. The simplest option is skirt type panel deployment but two-axis driven deployable panels provides additional weight margin. A prototype is proposed for structural, thermal and electrical tests and as a back up for the flight model. Author (ESA)

N83-30471# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
AUTONOMOUS PAYLOAD CONTROL c18
J. Beck, W. Markwitz, and G. Mayer *In its* DFVLR/ISRO Colloq. About a Decade of Cooperation in the Field of Space Res. and Technol. Jan. 1983 p 89-98 refs (For primary document see N83-30466 19-12)
Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 35,20

The satellite-borne sensor data autonomy concept is introduced. Experimental instrument data is encoded into an autonomous data package, along with engineering parameters and ancillary data, which are transmitted to ground. Each data package consists of a header, to identify the information origin; a data set, containing instrument and ancillary data; and a trailer, to secure efficient error control. Data are received in near real time at the checkout terminal via ground station facilities and data distribution networks. The concept uses onboard data reduction. Use of standard interfaces and protocols eliminates development of mission-unique hardware/software in the information transfer process. Data acquisition sampling rate is adapted to the process being observed. Onboard memory and link bandwidth resources are allocated on the basis of current resource demands among all instruments. Author (ESA)

N83-30472# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
REMARKS ON DFVLR RESEARCH ACTIVITIES ESPECIALLY CONCERNING MULTISPECTRAL ELECTRO-OPTICAL STEREO SCANNER (MEOSS) AND AUTOMATIC PAYLOAD CONTROL (APC) WITH RESPECT TO OTHER EXPERIMENTS c43
H. Haeberle *In its* DFVLR/ISRO Colloq. About a Decade of Cooperation in the Field of Space Res. and Technol. Jan. 1983 p 99-102 (For primary document see N83-30466 19-12)
Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 35,20

The MEOSS threefold stereoscopic linescan imager is compared with the STEREOSAT, MAPSAT, SPOT and Modular Optoelectronic Multispectral Scanner (MOMS) systems. The MEOSS instrument is designed to test threefold stereoscopic imaging technology and image processing, and has a coarser image grid than instruments for larger satellites. The MOMS, SPOT, STEREOSAT and MAPSAT instruments have smaller swath width, and very high resolution for small scale topographic analysis and map generation of the land surface. Author (ESA)

N83-30473# Indian Space Research Organization, Ahmedabad. Space Applications Centre.
MICROWAVE REMOTE SENSING PROGRAM OF THE INDIAN SPACE RESEARCH ORGANIZATION (ISRO) AND DFVLR c35
D. S. Kamat *In* DFVLR DFVLR/ISRO Colloq. About a Decade of Cooperation in the Field of Space Res. and Technol. Jan. 1983 p 103-111 (For primary document see N83-30466 19-12)
Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 35,20

The design and development of a spaceborne microwave radiometer system for Bhaskara satellites and an X band airborne real aperture radar system are summarized. Other projects include development of a 2 to 8 GHz scatterometer, an 8 to 18 GHz scatterometer, an L band radiometer, an X band field scatterometer, and an L or C band SAR system. Author (ESA)

N83-30474# Indian Space Research Organization, Sriharikota.
SUMMARY OF THE PRESENTATION MADE ON JANUARY 27, 1982 ON INDIAN SPACE RESEARCH ORGANIZATION (ISRO)-DFVLR COOPERATION PROJECT ON COMPUTER NETWORKING c61
T. Viswanathan *In* DFVLR DFVLR/ISRO Colloq. About a Decade of Cooperation in the Field of Space Res. and Technol. Jan. 1983 p 113-120 refs (For primary document see N83-30466 19-12)
Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 35,20

A project to design and develop software packages for the interconnection of PDP 11/VAX 11 real time networks to IBM or IBM compatible networks and for the interconnection of heterogeneous computers (CDC, UNIVAC, IRIS) via a PDP 11 is summarized. A high level language is used. The network supports batch services; time sharing services; file transfer services; remote file access; inter task communication services; and virtual terminal support. Author (ESA)

N83-30475# Ruhr Univ., Bochum (West Germany).
COLLABORATION IN THEORETICAL PLASMA PHYSICS BETWEEN THE PHYSICAL RESEARCH LABORATORY IN AHMEDABAD, INDIA AND THE SONDERFORSCHUNGSBEREICH 162 AT THE RUHR-UNIVERSITAET BOCHUM, WEST GERMANY AND THE DFVLR-INDIAN SPACE RESEARCH ORGANIZATION (ISRO) COLLABORATION CONTRACT DURING THE YEARS 1978-1981 c75
G. Ecker *In* DFVLR DFVLR/ISRO Colloq. About a Decade of Cooperation in the Field of Space Res. and Technol. Jan. 1983 p 121-127 refs (For primary document see N83-30466 19-12)
Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 35,20

Turbulent plasmas in the magnetosphere, the magnetosheath and the magnetospheric tail were studied. Nonlinear theory of tearing-mode instability was developed. Turbulence associated with the phenomena of spread-F and of the equatorial electrojet (type 1 and type 2 irregularities) was examined. Propagation characteristics of whistlers and whistler solitons, and the nonlinear effects of solitons were investigated, as were VLF and ULF emission. Author (ESA)

N83-30476# Physical Research Lab., Ahmedabad (India).
INDIAN SPACE RESEARCH ORGANIZATION (ISRO)-DFVLR COLLABORATION IN SPACE SCIENCES c75
D. Lal, R. V. Bhonsle, S. P. Gupta, and B. H. Subbaraya *In* DFVLR DFVLR/ISRO Colloq. About a Decade of Cooperation in the Field of Space Res. and Technol. Jan. 1983 p 129-139 (For primary document see N83-30466 19-12)
Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 35,20

A study of the equatorial spread F, rocket measurement of nitric oxide and ozone in the tropical mesosphere, and investigations of nonlinear plasma processes and instabilities in space plasmas are summarized. The neutral dynamics and plasma physical mechanisms that lead to the generation of the irregularities and their spatial spectra are examined. An empirical model of the

spectral distribution of the irregularities is developed. The relationship between the irregularity spectra and the propagation parameters of electromagnetic waves in the different frequency bands is analyzed. Author (ESA)

N83-30477# Hawaii Univ., Honolulu.
FROM AFRICA TO THE STARS
Ben R. Finney and Eric M. Jones (Los Alamos National Lab.) 1983 21 p Presented at the 6th Princeton Conf. on Space Manuf., Princeton, N.J., 9-13 May 1983
(Contract W-7405-eng-36)
(DE83-009897; LA-UR-83-929; CONF-830532-1) Avail: NTIS HC A02/MF A01

The thesis is developed that mankind's evolutionary future, like its past, is tied to the penchant for exploration and migration. The main stages of human exploration and migration are examined, with the evolutionary implications of each, starting from the time distant ancestors first stood upright and continuing into the coming era of space expansion. DOE

N83-30478# European Space Agency, Paris (France).
MATERIALS SCIENCES UNDER MICROGRAVITY
T. D. Guyenne, ed. 1983 104 p refs Presented at 4th European Symp., Madrid, 5-8 Apr. 1983; sponsored by ESA, Univ. Politecnica de Madrid (UPM), European Low-Gravity Research Assoc. (ELGRA) and COSPAR
(ESA-SP-191) Avail: NTIS HC A06/MF A01

Composites and heterogeneous phases, experimental facilities and programs, transport phenomena, combustion, gas-liquid interfaces, and liquid-solid interfaces were discussed.Author (ESA)

N83-30479# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
ENVIRONMENTAL EFFECTS ON MATERIALS FOR SPACE APPLICATIONS
Loughton, England Specialized Printing Services Ltd. Mar. 1983 221 p refs Conf. held in Toronto, 19-24 Sep. 1982
(AGARD-CP-327; ISBN-92-835-0330-9) Avail: NTIS HC A10/MF A01

The mechanical, surface, electrical, and thermal properties of spacecraft construction materials are examined as well as the effects of temperature, vacuum, radiation, charged particles, micrometeoroids, contaminants, and the pre-launch environment on these materials. Tests methods are assessed. For individual titles, see N83-30480 through N83-30496.

N83-30480# Aeritalia S.p.A., Torino (Italy). Space Sector.
FRACTURE MECHANICS AND FATIGUE CRITERIA IN MATERIAL SELECTION FOR SPACE APPLICATIONS **c18**
E. Vallerani, P. Marchese, and G. Banino *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 19 p refs (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01

The basic concepts employed in selecting fatigue and fracture resistance materials for the Spacelab design are reviewed, and specific examples of the application of these concepts are presented. The importance of the consideration of the strength and stress corrosion resistence is addition to toughness and fatigue strength is emphasized, especially for the selection of the aluminum alloys that cover most of the pressurized shell and internal structure. Weld material behavior and welding processes were carefully evaluated prior to material selection, and after the selection largely tested to confirm the choice. The possibility of automatic or manual repair without changes fracture-resistance and strength properties is considered. Fracture mechanics and fatigue analysis is summarized as well as nondistructive inspection methodologies and their practical application. Full scale fatigue and fracture mechanics tests and component level tests on some Spacelab structural parts are considered. Author

N83-30481# Spar Aerospace Ltd., Weston (Ontario). Space and Electronics Group.
STRUCTURAL DESIGN AND TEST OF THE SHUTTLE RMS **c16**
D. M. Gossain and P. J. Smith *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 10 p refs Sponsored in part by the National Research Council of Canada (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01

The 15.24 m (50 ft) long mechanical arm of the remote manipulator system (RMS) of the space shuttle orbiter was designed to meet stringent weight, stiffness and spatial envelope requirements. The design constraints on the arm structure and joints are described. Structural loads are evaluated and materials selection is considered. The design details of the structural elements and the joints are given. An extensive test program undertaken to qualify and verify the design at component, joint, subsystem and system level is discussed with emphasis on dynamic and static structural tests of structural elements and joints. Author

N83-30482# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
SPACECRAFT THERMAL CONTROL SELECTION FOR SEVEN YEARS LIFETIME IN SYNCHRONOUS ORBIT **c18**
L. Preuss *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 9 p (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01

Nonconductive and conductive flexible secondary surface mirrors (SSMs) with interference filters on top are examined. The SSM composition is analyzed and defined and the optimization procedure is outlined. The qualification of the SSMs in laboratory scale for the synchronous orbit is demonstrated. The most essential characteristics of the improved SSMs are summarized. Specifications for handling, application, and performance are established for SSMs. Author

N83-30483# Societe Nationale Industrielle Aerospatiale, Cannes (France).
DESIGN AND TESTING OF A CARBON-EPOXY TRELLIS STRUCTURE FOR SATELLITES [REALISATION ET ESSAIS D'UNE STRUCTURE TREILLIS CARBONE-EPOXY POUR SATELLITES] **c15**
J. F. Patin and J. L. Cecconi *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 8 p In FRENCH (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01

A trellis structure with high dimensional stability was studied and constructed. The bars of the trellis are based on high modulus (GY 70) high resistant (T 300) fibers and have a specific elevated rigidity and an expansion coefficient near zero. The joining elements between the bars are based on high modulus (M 40) fibers. The expansion coefficients of each element were adjusted so as to have an equivalent coefficient of expansion (near zero) between the points where the bars converge. The dimensional stability of the different connections as a function of temperature was verified. Space-type thermal cycling does not affect the mechanical behavior of the structure. Static tests of the trellis show that the high rigidity of the structures conform to the hypothesis of dimensioning. The mechanical strength was confirmed by tests, a first stage needed joint reinforcement. Transl. by A.R.H.

N83-30484# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
THE EFFECT OF SPACE ENVIRONMENT ON THE THERMAL DISTORTION OF POLYMER MATRIX COMPOSITES **c24**
R. C. Tennyson, G. E. Mabson, and S. Ahmed (Communication Research Centre) *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 14 p refs Sponsored in part by Communication Research Centre of Canada (For primary document see N83-30479 19-12)
(Grant AF-AFOSR-3694-78)
Avail: NTIS HC A10/MF A01

The combined effects of vacuum, thermal cycling, and UV radiation on the thermal distortion of selected polymer matrix composites were investigated. Data was obtained for exposure periods exceeding 400 days in hard vacuum and over 180

equivalent sun days of UV radiation. During this time, in situ measurements of the thermal distortion and coefficients of thermal expansion (CTE) were made using strain gauges and laser interferometry. Results were compared to an analytical model to demonstrate the usefulness of the data in predicting the thermal response of arbitrary laminates. Author

N83-30485*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SPACE ENVIRONMENTAL EFFECTS ON MATERIALS c23
Darrel R. Tenny, George F. Sykes, and David E. Bowles *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 24 p refs Previously announced as A83-14125 (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01 CSCL 07B

Research efforts at NASA-Langley to characterize the durability of composite materials which are candidates or use as components on various space hardware systems are reviewed. The material applications include large space structures, antennas, cables, thermal control coatings, solar reflectors, and satellite power systems. Simulation facilities have been built to study radiation effects on polymer matrix composites, and the dimensional stability of the matrix composites and tension stabilized.
M.S.K. (IAA)

N83-30486# Office National d'Etudes et de Recherches Aeronautiques, Paris (France).
SIMULATION OF THE ACOUSTIC ENVIRONMENT OF A LAUNCHER AND OF THE NOISE-INDUCED VIBRATIONS ON ITS STRUCTURES [SIMULATION DE L'ENVIRONEMENT ACOUSTIQUE D'UNE LANCEUR AU DECOLLAGE ET DE SES EFFETS VIBRATOIRES SUR LES STRUCTURES] c15
Alain Bourgine *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 11 p refs In FRENCH; ENGLISH summary (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01

During the launching and transonic flight of a launcher, high level and wide-band frequency vibrations are transmitted to the payload and equipments. Preliminary simulation tests are planned to reproduce these dangerous phenomena; however, classical test facilities (reverberant acoustic chambers) generally do not provide simultaneously the true space and time distribution of the flight pressure fluctuations. A method is described for forcing the vibratory response of the launcher wall, for instance at the shroud which shelters the satellite. (Statistical characteristics of this response are known by a previous analytical prediction). Forced vibrations are produced by using a few number of electrodynamic shakers acting on the wall; the N random forces are simultaneously synthesized on a digital computer. The proper simulation is realized when measured responses at N points exhibit spectral distributions and overall RMS levels very close to the predicted flight values. Then, the noise level inside the shroud and the vibrations transmitted to the payload are also very close to the flight conditions. Some examples of applications to realistic structures, as the shroud of the Ariane vehicle, are presented.
Author

N83-30487# Royal Aircraft Establishment, Farnborough (England).
ELECTROSTATIC DISCHARGING BEHAVIOUR OF KAPTON AND OTHER DIELECTRIC MATERIALS IN A SIMULATED SPACE ENVIRONMENT c23
A. A. Dollery and D. Verdin (Atomic Energy Research Estab.) *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 16 p refs (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01

The electrostatic charging and discharging of different thicknesses of Kapton when irradiated in vacuum with mono-energetic electrons of 5 to 30 keV energy was studied at different temperatures. The leakage currents and rates of discharging always increased with the incident electron energy and flux, whereas the surface voltage showed a more complex behavior, exhibiting a maximum and then falling at higher energies for the thinner films. The surface voltage, the rate of discharging, the peak current, and the total charge flow during a discharge were enhanced as the temperature was decreased from +70 C to -180 C. The results are discussed in terms of the resistivity of the polymer and the secondary emission of electrons, and they demonstrate that very thin Kapton films are markedly less susceptible to electrostatic charging and discharging. The electrostatic behavior of Kapton when it is incorporated into a laminated material, or when used as an insulator for an electric heater pad, or in the form of a substrate for a flexible solar array is also described. In addition, data are presented which demonstrate the performance of thermal control paints (Chemglaze A276 and L300), aluminized PTFE, and solar cell cover glasses under similar conditions. M.G.

N83-30488# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
CANDIDATE MATERIALS FOR PRETENSIONED MEMBRANES OF FIBRE COMPOSITE MATERIALS FOR SPACE APPLICATION c24
W. Buchs *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 6 p refs (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01

The properties of pretensioned membranes of fiber composite materials under consideration for use as solar cell substrates, thermal shields, etc., were examined. Various particular areas of investigation arose from loads (launch vibrations) and environmental conditions (vacuum, temperature, irradiation). Glass-, carbon- and aramidfabric composite materials were analyzed with respect to the requirements and the interfaces determined by the tensioning frame. Sections and full-scale samples of some membranes were manufactured and tested with methods, which in several cases had to be specifically developed for these purposes. Special attention was given to the decrease of characteristics of aramid-fiber composites under UV-irradiation. Analysis results are presented as well as test data and manufacturing experience. Author

N83-30489*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
EFFECTS OF LONG DURATION EXPOSURE TO SIMULATED SPACE ENVIRONMENT ON NONMETALLIC MATERIALS PROPERTIES c27
Charles L. Peacock, Jr. and Ann F. Whitaker *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 14 p refs (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01 CSCL 11G

Nonmetallic materials specimens from the Viking program were tested in situ invacuo after continuous thermal vacuum exposure from 1971/1972 to the present. Eleven tests were done on appropriate specimens of 30 materials; however, no single material received all the tests. Some specimens also were exposed to 1 or 2.5 MeV electrons at differing fluences before testing. Baseline exposure data is reported for graphite/epoxy specimens that were exposed to vacuum since 1974. These materials were transferred to the thermal vacuum storage facility for future in situ testing and irradiation. Thin G/E specimens were tensile tested after thermal-vacuum cycling exposure. Photomicrographic examinations and SEM analyses were done on the failed specimens. Author

N83-30490# Istituto di Tecnologia Aerospaziale, Rome (Italy).
STRUCTURAL DAMPING OF COMPOSITE MATERIALS FOR SPACE APPLICATIONS c39
Luigi Balis-Crema, Renato Barboni, and Antonio Castellani *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 8 p refs Sponsored in part by Ministero Pubblica Istruzione (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01

A series of experimental tests carried out on specimens of composite materials is presented. The measured damping ratios were obtained, in a vacuum chamber (10 to the -6 power torr), from the three first bending modes resonance (frequency range between 15 and 1400 Hz). The influence of the following parameters is considered: vibration amplitudes, frequency, air pressure, laminae number and mode shape. The tests were performed with an electromagnetic exciter and a vibration detector; the measure-

ments of the damping coefficient were worked by the frequency sweep and the decay transient method. Author

N83-30491*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SILICON SOLAR CELL CHARACTERIZATION AT LOW TEMPERATURES AND LOW ILLUMINATION AS A FUNCTION OF PARTICULATE IRRADIATION **c44**
Ann F. Whitaker, Sally A. Little, and Charles L. Peacock, Jr. *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 9 p refs (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01 CSCL 10A

Various configurations of back surface reflector silicon solar cells including small (2 x 2) cm and large (approx. 6 x 6) cm cells with conventional and wraparound contacts were subjected to 1 MeV electron irradiation and characterized under both Earth orbital and deep space conditions of temperatures and illuminations. Current-Voltage (I-V) data were generated from +65 C to -150 C and at incident illuminations from 135.3 mW/sq cm to 5.4 mW/sq cm for these cells. Degradation in cell performance which is manifested only under deep space conditions is emphasized. In addition, the effect of particle irradiation on the high temperature and high intensity and low temperature and low intensity performance of the cells is described. The cells with wraparound contacts were found to have lower efficiencies at Earth orbital conditions than the cells with conventional contacts. Author

N83-30492# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
THE EFFECT OF SPACE ENVIRONMENT ON THE DAMPING OF POLYMER MATRIX COMPOSITE **c39**
R. C. Tennyson, W. D. Morison, and G. E. Mabson *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 15 p refs Sponsored in part by Natural Sciences and Engineering Research Council of Canada (For primary document see N83-30479 19-12)
(Grant AF-AFOSR-3694-78)
Avail: NTIS HC A10/MF A01

A combined experimental and analytical investigation was undertaken to evaluate material damping of laminated composites. Particular emphasis was given to the effect of thermal-vacuum exposure and U.V. radiation on the change in damping response. A laminate analysis was developed for predicting material damping utilizing experimentaly determined principal damping coefficients. Results are presented based on flexural vibration and creep compliance tests performed on graphite/epoxy laminates at ambient conditions and in a space simulator. Author

N83-30493# Spar Aerospace Ltd., Weston (Ontario). Space and Electronics Group.
TESTING OF FLEXIBLE DEPLOYED SOLAR ARRAY (L-SAT) **c15**
P. A. McIntyre, A. S. Jones, J. Renshall, and G. W. Marks *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 16 p refs (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01

The L-SAT solar array subsystem was subjected to qualification testing at both the integrated system, subassembly and component level. In addition, development testing was carried out on critical items of the design, specifically that associated with blanket behavior during deployment and Apogee Engine and RCS firing, L-SAT being the first flexible array to be operational during Apogee Engine firing. The test philosophy being adopted is similar to that used on the Communications Technology Satellite (Hermes), however, due to the size of the array and facilities available, array natural frequencies will be predicted by analysis and modal test methods. Electrical component subsystem testing covering solar cell, array blanket pyro-techniques and other electrical items are discussed and the status of development tests completed to date is reviewed. Author

N83-30494# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
THE MBB COMBINED EFFECTS CHAMBER FOR REAL TIME AND ACCELERATED TESTS UNDER SIMULATED SPACE ENVIRONMENT **c14**
Otto K. Husmann *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 8 p refs (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01

The MBB Space Division solar radiation simulation test facility is described. This test equipment is fully automated and runs without interruption 24 hours a day, as long as specified, with its radiation sources operating simultaneously or alone. The test chamber provides clean vacuum. The sample temperatures are adjustable between -30 C and +100 C. The UV - radiation exposures may be accelerated up to 6 solar constants. The electron and the proton current densities can be selected from 10 to the -10 power amps/sq cm to 10 to the -8 power amps/sq cm. Their energies may range from 5 KeVolts to 60 KeVolts. Eight samples size 11 x 11 mm are exposed simultaneously, or four samples 20 x 20 mm. For assessment of damages inflicted a spectrometer is mated to the vacuum chamber for in situ measurement of sample spectral reflectances from 240 nm to 2.5 um. Author

N83-30495# Toronto Univ., Downsview (Ontario). Inst. for Aerospace Studies.
THE EFFECT OF COMBINED U.V. RADIATION AND HIGH ENERGY ELECTRONS ON THE BEHAVIOUR OF POLYMER MATRIX COMPOSITES IN HARD VACUUM **c27**
R. C. Tennyson, B. A. W. Smith, and L. P. Hebert *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 12 p refs Sponsored in part by Natural Sciences and Engineering Research Council of Canada (For primary document see N83-30479 19-12)
(Grant AF-AFOSR-3694-78)
Avail: NTIS HC A10/MF A01

A description of a space simulator capable of thermal-vacuum testing of samples subject to combined UV and high energy electron radiation is presented. Particular attention is given to the use a natural beta emitting Sr90 source to simulate space conditions. In-situ thermal and mechanical loading capabilities are also described together with test results obtained on selected polymer matrix composites. Specifically, graphite/epoxy and Kevlar/epoxy laminates have been employed to assess the combined effects of hard vacuum, thermal cycling and radiation on the change in stiffness, creep compliance and coefficient of thermal expansion. Author

N83-30496# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany).
THERMAL CYCLING TESTS ON MATERIALS AND COMPONENTS FOR SPACE APPLICATIONS **c23**
H. Hamacher, W. Ley, and K.-V. Rehmann *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 9 p refs (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01

Thermal cycling tests were performed on materials and components under high vacuum conditions. The purpose of these tests was to investigate changes in properties by thermal fatigue due to microcracking, delamination, etc. The test facility used was developed with respect to the need of true simulation of the strong temperature gradients to be expected in space flight. Tests were performed on carbon fiber composite materials which are candidates for large space structures use and on solar cell panel samples. The description of the facility, a presentation and discussion of the results is given. Author

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N83-30497# Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE RESURRECTION OF LAPLACE'S METHOD OF INITIAL ORBIT DETERMINATION

Laurence G. Taff 17 Jan. 1983 69 p refs
(Contract F19628-80-C-0002; AF Proj. 2690; AF Proj. 2295)
(AD-A126174; ESD-TR-82-160; TR-628) Avail: NTIS HC A04/MF A01 CSCL 03/3

This report deals with a number of interrelated topics. The common thread is Laplace's method of initial orbit determination based on passively acquired optical data. We discuss this method's principal competitor (that of Gauss), the difficulties of Gauss's technique, and the traditional reasons the Gaussian method is preferred to the Laplacian. We reject this hegemony for a variety of reasons and concentrate on Laplace's method in an era of a surfeit of high quality data. This leads us into a discussion of data smoothing. Once one leaves the raw observatorial data the possibility of combining observations from multiple observers comes to mind and hence the determination of parallax by trigonometrical means. All of this may be applied to two different classes of objects-astroids and artificial satellites. Our immediate interests are in fast moving asteroids (greater than 0.5/day or an abnormally fast ecliptic latitude rate) and high altitude artificial satellites (P greater than 6h). In both instances it is the high inclination and high eccentricity subset which is of special concern. Author (GRA)

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

N83-30494# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
THE MBB COMBINED EFFECTS CHAMBER FOR REAL TIME AND ACCELERATED TESTS UNDER SIMULATED SPACE ENVIRONMENT
Otto K. Husmann *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 8 p refs (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01

N83-31180 Norton AFB Ballistic Missile Office, Calif. Lightning and Transients Research Inst.
LIGHTNING PROTECTION ZONES FOR ROCKET LAUNCH COMPLEXES
A. Murakami, K. R. Pinckney, and J. D. Robb *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 10 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31287# European Space Agency, Noordwikj (Netherlands). Special Projects Div.
THE BIORACK
D. A. M. Mesland and A. F. L. Soons *In its* Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 11-15 (For primary document see N83-31285 19-51)
Avail: NTIS HC A07/MF A01

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N83-30498 Royal Aircraft Establishment, Farnborough (England).
COVERAGE PREDICTIONS AND SELECTION CRITERIA FOR SATELLITE CONSTELLATIONS
J. G. Walker 2 Dec. 1982 66 p refs
(RAE-TR-82116; RAE-Space-621; BR87935) Copyright. Avail: Issuing Activity

In order to assist the prediction of the Earth-coverage capabilities of large constellations of satellites, patterns based on regular tesselations of a plane surface and of others based on regular polyhedrons were studied. Trends associated with increasing numbers of satellites and degrees of coverage were identified, permitting extrapolation from the known capabilities of smaller satellite constellations. Investigation of selection criteria emphasized the importance of the minimum intersatellite distance, which provides a criterion for preliminary studies. This was used to examine nonuniform orbital patterns. An improved method of synthesizing such patterns is suggested. The requirements of the Global Positioning System navigation satellite system are discussed. Author (ESA)

N83-30499 Royal Aircraft Establishment, Farnborough (England).
UPPER-ATMOSPHERE FEATURES REVEALED BY THE ORBIT OF 1980-43A
A. N. Winterbottom and D. G. King-Hele 11 Jan. 1983 33 p refs
(RAE-TR-83002; RAE-Space-623; BR87438) Copyright. Avail: Issuing Activity

The satellite NOAA-B (1980-43A) was launched in May 1980 into an orbit with perigee height near 260 km and apogee height 1440 km, at an inclination of 92.2 deg. The lifetime was 11 months. The orbit has been determined at 40 epochs between October 1980 and May 1981 from about 3000 radar and optical observations. The average orbital accuracy, radial and cross-track, was about 100 m, with rather better accuracy in the final 14 days. The variation of orbital inclination has been analyzed to determine two good values of atmospheric rotation rate, namely 1.10 + or - 0.10 rev/day at 300 km (average local time) and 1.15 + or - 0.06 rev/day at 225 km (evening). The effect of atmospheric rotation on the precession of the orbital plane of an actual satellite has never previously been detected; it is clearly apparent for 1980-43A in its last days, and conforms to the expected theoretical change. The variation of perigee height has been analyzed to determine ten values of atmospheric density scale height, for heights of 280-370 km. These values, accurate to about 3%, exceed by 15% the values indicated by the COSPAR International Reference Atmosphere. Solar activity was higher in the years 1980-81 than at any time since early 1958, and it appears that the CIRA model underestimates the density and density scale height at high levels of solar activity. Author (ESA)

N83-30500*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
INTERNATIONAL ULTRAVIOLET EXPLORER SOLAR ARRAY POWER DEGRADATION
John H. Day, Jr. Jan. 1983 77 p refs
(NASA-TM-84989; NAS 1.15:84989) Avail: NTIS HC A05/MF A01 CSCL 22B

The characteristic electrical performance of each International Ultraviolet Explorer (IUE) solar array panel is evaluated as a function of several prevailing variables (namely, solar illumination, array temperature and solar cell radiation damage). Based on degradation in the current-voltage characteristics of the array due to solar cell damage accumulated over time by space charged particle radiations, the available IUE solar array power is determined for life goals up to 10 years. Best and worst case calculations are normalized to actual IUE flight data (available solar array power versus observatory position) to accurately predict the future IUE solar array output. It is shown that the IUE solar array can continue to produce more power than is required at most observatory positions for at least 5 more years. Author

N83-30501# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
AN ANALYTICAL SOLUTION FOR THE TEMPERATURE DISTRIBUTION OF MOUNTING PLATES OF SATELLITES
Nellore S. Venkataraman Jul. 1983 12 p refs Presented at the

35th Ann. Meeting of SBPC, Belem, Brazil, 6-13 Jul. 1983
(INPE-2805-PRE/365) Avail: NTIS HC A02/MF A01

An analytical solution was obtained for the temperature distribution in a thin rectangular plate with two regions of internal heat generation. One of the sides is subjected to a constant heat flux, while the others are at specified temperatures. The problem was resolved by using linear superposition and an image technique. Author

N83-30502# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
THE MODELLING FOR FORCES AND TORQUES ON NEAR EARTH SATELLITES: APPLICATION TO A PROPOSED BRAZILIAN SATELLITE
Nellore Srinivasan Venkataraman and Valdemir Carrara May 1983 13 p refs To be presented at the 7th Congr. Brasil. de Eng. Mecan., Uberlandia, Brazil, 13-16 Dec. 1983
(INPE-2758-PRE/334) Avail: NTIS HC A02/MF A01

The free molecular theory of rarefied gas dynamics and simple radiation theory are used to calculate the forces and torques on the proposed first Brazilian satellite. The direct solar radiation, albedo and Earth emitted radiation are taken into account. The variation of these forces with the pertinent parameters as well as their orbital variations are discussed. Author

N83-30503# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
SYNTHESIZER-MODULATOR FOR SCPC SATELLITE EARTH STATION [SINTETIZADOR/MODULADOR PARA ESTACAO TERRENA SCPC DE TELECOMUNICACOES POR SATELITE]
Paulo Adabo May 1983 46 p refs In PORTUGUESE; ENGLISH summary Presented at the 3rd Ann. Reunion of the SBPC, Belem, Brazil, 6-13 Jul. 1983
(INPE-2732-PRE/314) Avail: NTIS HC A03/MF A01

The study, design, and practical implementation of a frequency synthesizer in the 52.020 MHz to 87.990 MHz band, with step of 30 kHz is comprised. A PLL (phase-locked loop) synthesis technique consists basically in using a PLL with a programmable divisor in the feedback loop. The output frequency is a function of the value of this divisor. This synthesizer has also the function of a FM modulator and is being used to generate 1200 different channels of a SCPC (single channel per carrier) Earth station. In the transmitter of this station, the carrier will be present in the output only when there is voice signal in the modulator input; so that it may occur, a carrier suppressor circuit is used. Author

N83-30504*# National Aeronautics and Space Administration, Washington, D. C.
PERIODIC MOTIONS (CLOSE TO STATIONARY) OF AN AXISYMMETRIC SATELLITE WITH MAGNETIC DAMPING
M. Yu. Ovchinnikov Apr. 1983 32 p refs Transl. into ENGLISH of "Blizkiye k Statsionarnym Periodicheskiye Dvizheniya Osesimmetrichnogo Sputnika s Magnitnym Dempferom" Preprint 178 Moscow, 1982 p 1-28 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-77215; NAS 1.15:77215) Avail: NTIS HC A03/MF A01 CSCL 22A

Close to stationary periodic motions of an axisymmetric satellite in a circular orbit are considered. The satellite was equipped with a spherical magnetic damper. The investigation was conducted on the assumption that a strong magnet was installed on the damper float. Stationary rotations of the satellite around the axis of symmetry are selected as the generating solutions. The solutions are constructed in the form of power series of the smaller parameter, and they are extended numerically to the region of random values of the damping coefficient. The stability of the resulting solutions was investigated. Author

N83-30505# Range Commanders Council, White Sands Missile Range, N. Mex. Range Safety Group.
FLIGHT TERMINATION SYSTEM EQUIPMENT. VOLUME 2: BATTERIES
Mar. 1983 88 p 2 Vol.
(AD-A127314; RCC/RSG-317-83-Vol-2) Avail: NTIS HC A05/MF A01 CSCL 10/3

This catalog provides a ready reference to batteries of flight termination systems used to support range safety functions at various U.S. missile ranges and test facilities. Inclusion in this catalog does not constitute approval by the Range Commander with in-flight safety responsibility. Approval for use of a particular battery on one range for a given missile does not constitute automatic approval for use of the some battery for other missile/space vehicles on the same range, or for the same missile/space vehicle on other ranges. The information in this catalog is taken from manufacturer's specifications and is provided only as a guide. Nothing is implied as to the relative merits of any one battery over another. The minimum specifications cited herein are representative of the individual range requirements. Detailed specifications requirements must be obtained from and coordinated with the lead range. A history of flight usage and laboratory tests is included, where possible. GRA

N83-30506# Army Field Artillery School, Fort Sill, Okla.
LANCE HANDBOOK, FIRING TEAM LEADER'S
Mar. 1983 84 p
(AD-A127320; AD-F400017) Avail: NTIS HC A05/MF A01 CSCL 16/4

This handbook is designed to assist an individual in gaining an understanding of the relationship between a lance firing team and an assembly and transport section in combat. Chapters on nuclear release, battle drill, survey and emergency destruction all assist in gaining an understanding of the lance system. It also lists the critical lance publications -- army regulations, field manuals, technical manuals etc. GRA

N83-30507# European Space Agency, Paris (France).
INTRODUCTION TO THE SIRIO-2 PROGRAM
B. Battrick, ed. and J. Mort, ed. Aug. 1981 37 p
(ESA-SP-1039; ISSN-0379-6566) Avail: NTIS HC A03/MF A01

The Sirio-2 meteorological data distribution (MDD) and laser synchronization from stationary orbit (LASSO) projects are described. The MDD mission provides links between small ground stations for meteorological data within the global telecommunications network of the World Meteorological Organization in Africa. Twenty-four 100 bps channels PCM/PM, and twelve 2400 bps channels PCM/PSK/PM are used. The MDD system elements are: small ground stations (40 dBW EIRP); transponder; and mechanically despun antenna on the satellite. The LASSO mission ensures intercontinental time comparison employing laser techniques, with accuracy of 1 nsec or better. It gives high availability to users and relatively free access to the system. The LASSO experiment consists of synchronizing two atomic clocks, linked to the ground laser station, to a very high precision by: on-board reception of lase pulses coming from the Earth; time tagging of the incoming light pulses; reflecting part of the pulses to the ground laser stations; and data handling and computation.
Author (ESA)

N83-30713# General Dynamics/Convair, San Diego, Calif.
ANALYSIS AND TESTING OF A NONLINEAR MISSILE AND CANISTER SYSTEM
R. G. Benson, A. C. Deerhake, and G. C. McKinnis *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 3 May 1982 p 77-87 refs (For primary document see N83-30709 19-31)
Avail: NTIS HC A12/MF A01 CSCL 22/2

N83-30719# General Dynamics/Convair, San Diego, Calif.
TOMAHAWK CRUISE MISSILE FLIGHT ENVIRONMENTAL MEASUREMENT PROGRAM
E. S. Rosenbaum and F. L. Gloyna *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 3 May 1982 p 159-228 refs (For primary document see N83-30709 19-31)
Avail: NTIS HC A12/MF A01 CSCL 22/2

N83-30730# Army Armament Research and Development Command, Dover, N. J.
FORCE OPTIMIZED RECOIL CONTROL SYSTEM
Philip E. Townsend, Robert J. Radkiewicz, and Robert F. Gartner (Honeywell, Inc.) *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 55-71 (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 16/4

N83-30460# Joint Publications Research Service, Arlington, Va.
KOSPAS-SARSAT SATELLITE RESCUE SYSTEM
Yu. Zubarov *In its* USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 64-66 Transl. into ENGLISH from Pravda (Moscow), 6 Aug. 1982 p 3 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

N83-30461# Joint Publications Research Service, Arlington, Va.
COMMUNICATION SATELLITE SYSTEMS
G. Markelov and M. Fedorov *In its* USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 67-69 Transl. into ENGLISH from Pravda (Moscow), 3 May 1982 p 3 Translation was announced as N83-71929 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

N83-30483# Societe Nationale Industrielle Aerospatiale, Cannes (France).
DESIGN AND TESTING OF A CARBON-EPOXY TRELLIS STRUCTURE FOR SATELLITES [REALISATION ET ESSAIS D'UNE STRUCTURE TREILLIS CARBONE-EPOXY POUR SATELLITES]
J. F. Patin and J. L. Cecconi *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 8 p In FRENCH (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01

N83-30486# Office National d'Etudes et de Recherches Aeronautiques, Paris (France).
SIMULATION OF THE ACOUSTIC ENVIRONMENT OF A LAUNCHER AND OF THE NOISE-INDUCED VIBRATIONS ON ITS STRUCTURES [SIMULATION DE L'ENVIRONEMENT ACOUSTIQUE D'UNE LANCEUR AU DECOLLAGE ET DE SES EFFETS VIBRATOIRES SUR LES STRUCTURES]
Alain Bourgine *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 11 p refs In FRENCH; ENGLISH summary (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01

N83-30493# Spar Aerospace Ltd., Weston (Ontario). Space and Electronics Group.
TESTING OF FLEXIBLE DEPLOYED SOLAR ARRAY (L-SAT)
P. A. McIntyre, A. S. Jones, J. Renshall, and G. W. Marks *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 16 p refs (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N83-30693*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SPACE SHUTTLE MAIN ENGINE (SSME) POGO TESTING AND RESULTS
J. R. Fenwick (Rockwell International), J. H. Jones, and R. E. Jewell *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 1-20 refs (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 22B

N83-30695*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SPACE SHUTTLE SOLID ROCKET BOOSTER REENTRY AND DECELERATOR SYSTEM LOADS AND DYNAMICS
Richard Moog (Martin Marietta) and Dennis A. Kross *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 27-33 (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 22B

N83-30700*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE DEVELOPMENT AND VERIFICATION OF SHUTTLE ORBITER RANDOM VIBRATION TEST REQUIREMENTS
M. C. Coody, H. K. Pratt (Rockwell International Corp.), and D. E. Newbrough (Management and Technical Services Corp.) *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 71-80 refs (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 22B

N83-30704*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DYNAMIC AND STATIC MODELING OF THE SHUTTLE ORBITER'S THERMAL PROTECTION SYSTEM
J. M. Housner, G. L. Giles, and M. Vallas *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 127-145 refs (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 22B

N83-30705*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
BUFFET LOADS ON SHUTTLE THERMAL-PROTECTION-SYSTEM TILES
Charles F. Coe *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 147-153 (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 22B

N83-30706*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
UNSTEADY ENVIRONMENTS AND RESPONSES OF THE SHUTTLE COMBINED LOADS ORBITER TEST
P. H. Schuetz (Rockwell International), L. D. Pinson, and H. T. Thornton, Jr. *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 157-163 refs (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 22B

N83-30726*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SINGLE POINT RANDOM MODAL TEST TECHNOLOGY APPLICATION TO FAILURE DETECTION
Walter M. West, Jr. *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 25-31 (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 22/2

N83-30773*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A NEW METHOD OF IMPROVING SPECTRA SHAPING IN REVERBERANT CHAMBERS
James N. Scott and Raymond L. Burkhardt (Northrop Services, Inc.) *In* Shock and Vibration Information Center The Shock and Vibration Bull., no. 50, part 2 Sep. 1980 p 207-215 refs 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 22B

N83-30777# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

ELIMINATION OF A DISCRETE FREQUENCY ACOUSTICAL PHENOMENON ASSOCIATED WITH THE SPACE SHUTTLE MAIN ENGINE OXIDIZER VALVE-DUCT SYSTEM
L. A. Schutzenhofer, J. H. Jones, R. E. Jewell, and R. S. Ryan *In* Shock and Vibration Information Center The Shock and Vibration Bull., no. 50, part 2 Sep. 1980 p 247-255 refs 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 22B

N83-30788*# Spar Aerospace Ltd., Toronto (Ontario).
ANALYSIS AND DESIGN OF THE SHUTTLE REMOTE MANIPULATOR SYSTEM MECHANICAL ARM FOR LAUNCH DYNAMIC ENVIRONMENT
D. M. Gossain, E. Quittner, and S. S. Sachdev *In* Shock and Vibration Bulletin, no. 50, part 3 Sep. 1980 p 125-149 refs Sponsored in part by NASA (For primary document see N83-30778 19-31)
Avail: NTIS HC A10/MF A01 CSCL 22B

N83-30789# Marquardt Corp., Van Nuys, Calif.
STRUCTURAL DYNAMIC CHARACTERISTICS OF THE SPACE SHUTTLE REACTION CONTROL THRUSTERS
Gersten L. Schachne and Jeffrey H. Schmidt *In* Shock and Vibration Bulletin, no. 50, part 3 Sep. 1980 p 151-162 refs (For primary document see N83-30778 19-31)
Avail: NTIS HC A10/MF A01 CSCL 22/2

N83-30801*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
AN EXPERIMENTAL INVESTIGATION OF NOISE ATTENUATING TECHNIQUES FOR SPACE-SHUTTLE CANISTERS
L. Mirandy (General Electric Co.), Frank J. On, and J. Scott *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50., Part 4 Sep. 1980 p 77-90 refs (For primary document see N83-30794 19-31)
(Contract NAS5-23412)
Avail: NTIS HC A11/MF A01 CSCL 22B

N83-31191 McDonnell-Douglas Technical Services Co., Inc., Houston, Tex.
CORRELATION OF SPACE SHUTTLE AS-BUILT ATMOSPHERIC CAPABILITIES WITH KNOWN ATMOSPHERIC CONDITIONS THAT PRODUCE LIGHTNING
Tim Fitzsimmons *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 12 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-30481# Spar Aerospace Ltd., Weston (Ontario). Space and Electronics Group.
STRUCTURAL DESIGN AND TEST OF THE SHUTTLE RMS
D. M. Gossain and P. J. Smith *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 10 p refs Sponsored in part by the National Research Council of Canada (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01

N83-30359# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
AEROTHERMODYNAMIC FLIGHT ENVELOPE EXPANSION FOR A MANNED LIFTING REENTRY VEHICLE (SPACE SHUTTLE)
J. K. Hodge, D. R. Audley, P. W. Phillips (AFFTC), and E. K. Hertzler (AFFTC) *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 12 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

N83-30360# Air Force Flight Test Center, Edwards AFB, Calif.
PREDICTED AND FLIGHT TEST RESULTS OF THE PERFORMANCE AND STABILITY AND CONTROL OF THE SPACE SHUTTLE FROM REENTRY TO LANDING
Paul W. Kirsten and David F. Richardson *In* AGARD Ground/Flight Test Tech. and Correlation Feb. 1983 23 p refs (For primary document see N83-30357 19-01)
Avail: NTIS HC A23/MF A01

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

N83-30508# Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
REVIEW ON PACKET TELEMETRY AND CONCEPTS ON PACKET TELECOMMAND: INPE PROPOSAL TO CCSDS/PANEL 1
Eduardo Whitaker Bergamini Jul. 1983 9 p refs Presented at the Consultative Comm. on Space Data Systems CCSDS Panel 1 Meeting on Telemetry, Tracking and Telecommand TTC, Darmstadt, West Germany, 4-8 Jul. 1983
(INPE-2800-PRE/360) Avail: NTIS HC A02/MF A01

Concepts for packet telemetry and telecommand are proposed for CCSDS/Panel 1. The propositions are inspired on the NASA/ESA concepts for packet telemetry as presented to CCSDS in 1982. The extended concepts would permit symmetric treatment of data acquisition and control by means of communicating end-to-end processes. Author

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N83-30509*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE MEASUREMENTS OF VEHICLE GLOW ON THE SPACE SHUTTLE
S. B. Mende (Lockheed Research Lab., Palo Alto, Calif.), P. M. Banks (Stanford Univ., Calif.), R. Nobles (Lockheed Missiles and Space Co., Palo Alto, Calif.), O. K. Garriott, and J. Hoffman 15 Mar. 1983 39 p refs
(NASA-TM-85360; NAS 1.15:85360; LMSC/D940124) Avail: NTIS HC A03/MF A01 CSCL 22B

From the combined data set of glow observations on STS-3, STS-4 and STS-5 some of the properties of the shuttle glow were observed. Comparison of the STS-3 (240 km) and STS-5 (305 km) photographs show that the intensity of the glow is about a factor of 3.5 brighter on the low altitude (STS-3) flight. The orbiter was purposely rotated about the x axis in an experiment on STS-5 to observe the dependence of the intensity on the angle of incidence between the spacecraft surface normal and the velocity vector. For a relatively large angle between the velocity vector and the surface normal there is an appreciable glow, provided the surface is not shadowed by some other spacecraft structure. As the angle becomes less the glow intensifies. The grating experiments (STS-4 photography only, STS-5 image intensifier photography) provided a preliminary low resolution spectra of the spacecraft glow. Accurate wavelength calibrations of the STS-5 instrument permitted measuring of the spectrum and intensity of the Earth's airglow. Author

N83-30510*# National Aeronautics and Space Administration, Washington, D. C.
STOCHASTIC ANALYSIS OF THE CONTROL OF THE MOVEMENT OF THE SPACECRAFT IN THE VICINITY OF THE CO-

LINEAR LIBRATION POINT BY MEANS OF THE FORCES OF LUMINOUS PRESSURE
S. S. Lukyanov May 1983 39 p refs Transl. into ENGLISH of "Stokhasticheskiy Analiz Upravleniya Dvizheniyem Kosmicheskogo Apparata v Okrestnosti Kollinearnoy Tochki Libratsii s Pomoshchyu Sil Svetovogo Davleniya" Preprint 130 Moscow, 1982 p 1-31 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-77224; NAS 1.15:77224) Avail: NTIS HC A03/MF A01 CSCL 22B

This paper is dedicated to the possible investigation of the utilization of the solar radiation pressure for the spacecraft motion control in the vicinity of collinear libration point of planar restricted ring problem of three bodies. The control is realized by changing the solar sail area at its permanent orientation. In this problem the influence of the trajectory errors and the errors of the execution control is accounted. It is worked out, the estimation method of the solar sail sizes, which are necessary for spacecraft keeping in the vicinity of collinear libration point during the certain time with given probability. The main control parameters were calculated for some examples in case of libration points of the Sun-Earth and Earth-Moon systems. Author

N83-30511# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. Dept. of Aeronautics and Astronautics.
A METHOD OF ACTUATOR PLACEMENT FOR VIBRATION CONTROL OF LARGE SPACE STRUCTURES M.S. Thesis - MIT
Ricky Eugene Ort Feb. 1983 90 p refs
(AD-A126940; AFIT/CI/NR-83-1-T) Avail: NTIS HC A05/MF A01 CSCL 22/2

This thesis presents several computationally simple techniques for choosing actuator placement on large space structures. Actuator and performance information can be represented as vectors (node shapes) in modal coordinates. The placement problem is stated as choosing a set of actuator node shapes to match the performance node shape. One method sequentially selects a set of actuator node shapes such that the norm of the component orthogonal to the already selected set is large. Another method sequentially selects actuator node shapes such that a large projection is obtained along the least squares residual vector resulting from the fit of the previously selected set to the performance node shape. These techniques are applied to a 100 meter cantilever beam. Good control authority over the primary modes is demonstrated. The second technique is modified to place actuators to achieve good control authority on primary modes while minimizing spillover effect. It is demonstrated that proper placement of actuators can limit spillover effect to selected modes. GRA

N83-30512# MATRA Espace, Paris-Velizy (France).
EFFECTS OF LONG LIFE REQUIREMENTS ON SPACECRAFT DESIGN AND TECHNOLOGY Final Report
C. Cougnet, C. Floch, J. F. Arnoult, G. Berger, Y. Dubois, M. Horblin, B. Schietecatte, and C. Vialet Paris ESA Nov. 1982 467 p refs
(Contract ESA-4847/81/NL-PP(SC))
(DM51.C/CC/FL/0138.82; ESA-CR(P)-1725) Avail: NTIS HC A20/MF A01

The impact on spacecraft design and technology of service life requirements of 15 yr in geostationary and 10 yr in low Earth orbit are summarized. Factors which limit service life are reviewed. The effects of improved technology, onboard computers and in space servicing are discussed. Control of the exposed area of spacecraft radiators to meet instantaneous requirements is suggested. Analysis of parameters which affect battery performance, annealing of solar arrays, and management of thermal control and other subsystems are considered. Author (ESA)

N83-30471# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
AUTONOMOUS PAYLOAD CONTROL
J. Beck, W. Markwitz, and G. Mayer *In its* DFVLR/ISRO Colloq. About a Decade of Cooperation in the Field of Space Res. and Technol. Jan. 1983 p 89-98 refs (For primary document see N83-30466 19-12)
Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 35,20

N83-30480# Aeritalia S.p.A., Torino (Italy). Space Sector.
FRACTURE MECHANICS AND FATIGUE CRITERIA IN MATERIAL SELECTION FOR SPACE APPLICATIONS
E. Vallerani, P. Marchese, and G. Banino *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 19 p refs (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01

N83-30482# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
SPACECRAFT THERMAL CONTROL SELECTION FOR SEVEN YEARS LIFETIME IN SYNCHRONOUS ORBIT
L. Preuss *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 9 p (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01

N83-30771# General Electric Co., Philadelphia, Pa. Space Div.
SINGLE-POINT RANDOM AND MULTI-SHAKER SINE SPACECRAFT MODAL TESTING
M. Ferrante, C. V. Stahle, and D. G. Breskman *In* Shock and Vibration Information Center The Shock and Vibration Bull., no. 50, part 2 Sep. 1980 p 191-198 refs 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 22B

N83-31239 Technische Univ., Hamburg (West Germany).
AEROSPACE VEHICLES CHARGING BY THRUSTER PLUMES
H. Trinke *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 6 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N83-30697*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
DEVELOPMENT OF AN AUTOMATED PROCESSING AND SCREENING SYSTEM FOR THE SPACE SHUTTLE ORBITER FLIGHT TEST DATA
D. K. McCutchen, J. F. Brose (Lockheed Engineering and Management Services Co., Inc.), and W. E. Palm (McDonnell Douglas Corp.) *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 43-51 (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 14B

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N83-30513 Prins Maurits Lab. TNO, Rijswijk (Netherlands).
DETECTION OF THE PRESENCE OF CASE/LINER AND LINER SUSTAINER DEBONDS IN IMPROVED HAWK ROCKET MOTORS BY MEANS OF ULTRASONIC PULSE ECHO-TECHNIQUE [ONDERZOEK MET DE ULTRASONE PULS-ECHO TECHNIEK

NAAR DE AANWEZIGHEID VAN CASE/LINER EN LINER/SUSTAINER DEBONDS HAWK RAKETMOTOREN]
A. Zwijnenburg Feb. 1981 38 p refs In DUTCH; ENGLISH summary
(PML-1981-20; TDCK-75338) Copyright. Avail: Issuing Activity

Pulse reflection technique measurements were performed on samples sawn from an improved Hawk rocket motor (with induced artificial motor case/liner and liner/sustainer debonds) in order to examine whether and to what extent an ultrasonic apparatus can be used for the detection of debonds. Motor case/liner debonds can be traced reasonably well. Liner/sustainer debonds cannot be shown, owing to the strong damping of the ultrasound in the liner and the propellant. Measurements performed on the propellant show damping coefficients of 775 dB/m whereas the damping in the liner has a much higher value. Investigations of the texture with an electron microscope prove that the strong damping in the liner is mainly due to the presence of many voids with diameters of 50 to 200 micrometers which strongly disperse the sound band. Author (ESA)

N83-30514 Prins Maurits Lab. TNO, Rijswijk (Netherlands).
RELIABILITY STUDY OF ROCKET PROPELLANTS AND ROCKET ENGINES. FIFTEENTH PARTIAL REPORT: LITERATURE STUDY AND EXPERIMENTAL INVESTIGATION TO DETERMINE THE STRENGTH OF ADHESIVE BONDINGS IN ROCKET ENGINES [BETROUWBAARHEIDSONDERZOEK VAN RAKETKRUIT EN RAKETOMOTOREN - VIJFTIENDE DEELVERSLAG. LITERATUURSTUDIE EN EXPERIMENTEEL ONDERZOEK NAAR METHODEN TER REPALING VAN DE STERKTE VAN ADHESIEVE BINDINGEN IN RAKETMOTOREN]
P. J. Greidanus, R. S. deVries, and A. Zweijnenburg 1981 58 p refs In DUTCH; ENGLISH summary
(Contract A64/KL/097)
(PML-1981-23-Pt-15; TDCK-75339) Copyright. Avail: Issuing Activity

Literature concerning techniques which measure the adhesion between various materials was surveyed and the suitability of these methods with available equipment was assessed. Experiments were performed on solid rocket propellants provided on the outside with a layer of inhibitor. The pulse-echo ultrasonic technique and infrared radiometry prove to be the best nondestructive methods for the determination of the bond strength between the propellant and the inhibitor, the propellants and the metal motor case, or that between the inhibitor and the motor case. The poker chip test proves to be the best method for the destructive determination of the bond strength. Author (ESA)

N83-30515*# Martin Marietta Aerospace, Denver, Colo.
ANALYSIS AND TEST FOR SPACE SHUTTLE PROPELLANT DYNAMICS Final Report
Robert L. Berry, Leonard J. Demchak, and James R. Tegart Washington NASA Jun. 1983 189 p refs
(Contract NAS9-15302)
(NASA-CR-3683; NAS 1.26:3683; MCR-81-528) Avail: NTIS HC A09/MF A01 CSCL 21I

This report presents the results of a study to develop an analytical model capable of predicting the dynamic interaction forces on the Shuttle External Tank, due to large amplitude propellant slosh during RTLS separation. The report details low-g drop tower and KC-135 test programs that were conducted to investigate propellant reorientation during RTLS. In addition, the development of a nonlinear finite element slosh model (LAMPS2, two dimensional, and one LAMPS3, three dimensional) is presented. Correlation between the model and test data is presented as a verification of the modeling approach. Author

N83-30516*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
POWER GENERATION FROM NUCLEAR REACTORS IN AEROSPACE APPLICATIONS
Robert E. English [1982] 76 p refs Presented at the Sump. on Advanced Compact Reactors, Washington, D.C., 15-17 Nov. 1982; sponsored by NRC
(NASA-TM-83342; E-1597; NAS 1.15:83342) Avail: NTIS HC A05/MF A01 CSCL 18E

Power generation in nuclear powerplants in space is addressed. In particular, the states of technology of the principal competitive concepts for power generation are assessed. The possible impact of power conditioning on power generation is also discussed. For aircraft nuclear propulsion, the suitability of various technologies is cursorily assessed for flight in the Earth's atmosphere; a program path is suggested to ease the conditions of first use of aircraft nuclear propulsion. Author

N83-30517*# National Aeronautics and Space Administration, Washington, D. C.
FLOW PROCESSES IN OVEREXPANDED CHEMICAL ROCKET NOZZLES. PART 3: METHODS FOR THE AIMED FLOW SEPARATION AND SIDE LOAD REDUCTION
R. H. Schmucker Mar. 1983 23 p refs Transl. into ENGLISH of "Stroemungsvorgaenge beim Betrieb Uberexpandierter Duesen Chemischer Raketentriebwerke. Teil 3: Methoden zur Gezielten Stroemungsabloesung und Seitenkraftverringerung" rept. TUM-LRT-TB-11-Pt-3 Technische Universitaet, Munich, 20 Sep. 1973 p 1-25 Original language document was announced as N75-26013 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-77048; NAS 1.15:77048) Avail: NTIS HC A02/MF A01 CSCL 21H

Methods aimed at reduction of overexpansion and side load resulting from asymmetric flow separation for rocket nozzles with a high opening ratio are described. The methods employ additional measures for nozzles with a fixed opening ratio. The flow separation can be controlled by several types of nozzle inserts, the properties of which are discussed. Side loads and overexpansion can be reduced by adapting the shape of the nozzle and taking other additional measures for controlled separation of the boundary layer, such as trip wires. Author

N83-30518# RAND Corp., Santa Monica, Calif.
NON-NUCLEAR AIR-TO-SURFACE ORDANCE FOR THE FUTURE: AN APPROACH TO PROPULSION TECHNOLOGY RISK ASSESSMENT Interim Report
W. P. Hutzler, J. R. Nelson, R. Y. Pei, and C. M. Francisco Feb. 1983 62 p refs
(Contract F49620-82-C-0018)
(AD-A127268; RAND/N-1973-AF) Avail: NTIS HC A04/MF A01 CSCL 21/8

Proposes a risk assessment method that addresses the likelihood of achieving technological advances for particular military hardware by quantifying (1) the technological state-of-the-art of that hardware and (2) the probability of achieving that program relative to past experiences with similar programs. The hardware considered in this research for state-of-the-art trending and risk assessment includes man-rated aircraft turbine engines, solid rocket motors, and non-man-rated missile and drone turbine engines. Preliminary evaluation of the various models indicates that, for the most part, the results agree with what engineers would expect concerning variables that are important to the trend of the technologies and to the outcomes for particular programs.
Author (GRA)

N83-30696# Thiokol Chemical Corp., Brigham City, Utah.
INVESTIGATION OF SIDE FORCE OSCILLATIONS DURING STATIC FIRING OF THE SPACE SHUTTLE SOLID ROCKET MOTOR
M. A. Behring *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 35-42 refs (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 21/8

N83-30707# Rockwell International Corp., Canoga Park, Calif.
VIBRATION MATURITY OF THE SPACE SHUTTLE MAIN ENGINES
Edward W. Larson and Earl Mogil *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982

p 165-176 (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 21/8

N83-30708# Rockwell International Corp., Canoga Park, Calif.
STRUCTURAL RESPONSE TO THE SSME FUEL FEEDLINE TO UNSTEADY SHOCK OSCILLATIONS
Edward W. Larson, Gary H. Ratekin, and George M. O'Connor *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 177-182 refs (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 21/8

N83-30775# Thiokol Corp., Brigham City, Utah.
LOW FREQUENCY STRUCTURAL DYNAMICS OF THE SPACE SHUTTLE SOLID ROCKET BOOSTER MOTOR DURING STATIC TESTS
M. A. Behring and D. R. Mason *In* Shock and Vibration Information Center The Shock and Vibration Bull., no. 50, part 2 Sep. 1980 p 235-239 refs 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 21/8

N83-30776# Thiokol Corp., Brigham City, Utah.
VIBRATION ENVIRONMENT OF THE SPACE SHUTTLE SOLID ROCKET BOOSTER MOTOR DURING STATIC TESTS
D. R. Mason and M. A. Behring *In* Shock and Vibration Information Center The Shock and Vibration Bull., no. 50, part 2 Sep. 1980 p 241-245 refs 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 21/8

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N83-30519*# National Aeronautics and Space Administration, Washington, D. C.
THE PREPARATION OF STEATITE SUSPENSION FOR SPRAY DRYING
L. Jirousek and K. Spicak May 1983 19 p refs Transl. into ENGLISH from Sklar a Keramik (Czechoslovakia), v. 32, no. 7, 1982 p 185-190 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-77064; NAS 1.15:77064) Avail: NTIS HC A02/MF A01 CSCL 07B

Liquifying agents were investigated for preparation of highly concentrated steatite suspensions which are to be spray-dried. Organic additives for improving the molding properties and strength of green compacts are described. Demands on properties of the spray-dried granules are defined with regard to shrinkage of the molded compacts. Author

N83-30520# University of Southern California, Los Angeles. Dept. of Chemistry.
ORGANOSILICON CHEMISTRY Final Report, 1 Oct. 1979 - 30 Dec. 1982
William P. Weber Dec. 1982 14 p refs
(Grant AF-AFOSR-0006-80; AF Proj. 2303)
(AD-A127343; AFOSR-83-0242TR) Avail: NTIS HC A02/MF A01 CSCL 07/3

Several new aspects of the chemistry of silylenes, divalent reactive silicon intermediates, have been explored. Insertion reactions of dimethylsilylene into O-H bonds of primary, secondary, and tertiary alcohols were studied. This provides an efficient route to alkoxydimethylsilanes. It was found that solvent significantly affects the reactivity of dimethylsilylene in such insertion reactions. The insertion of dimethylsilylene into Si-O bonds of alkoxysilanes permits the synthesis of a novel series of cyclic polysilanes. New insertion reactions of dimethyldilylene into silicon-sulfur and sulfur-sulfur bonds were discovered. In the chemistry of siloxane oligomers it was found that secondary and tertiary alkyl lithium reagents will add to the carbon-carbon bond of vinyl di-or trisiloxanes at low temperatures to yeild alpha-lithio di-or trisiloxanes at low temperatures to yield alpha-lithio di-or trisiloxanes with no attack by the alkyl lithium reagent on the siloxane bond. GRA

N83-30521# Army Medical Bioengineering Research and Development Lab., Fort Detrick, Md.
IDENTIFICATION OF XENOBIOTIC CONTAMINANT OF FIELD WATER SUPPLY SYSTEM DESIGNED FOR RAPID DEPLOYMENT FORCE
Elizabeth P. Burrows and Stephen A. Schaub Mar. 1983 14 p refs
(AD-A127387/9; USAMBRDL-TR-8301) Avail: NTIS HC A02/MF A01 CSCL 12/1

Analysis of methylene chloride extract of water from a field storage and distribution system tested at Fort Irwin, CA, was performed at US Army Medical Bioengineering Research and Development Laboratory and the previously unidentified major organic contaminant was shown to be 5,8,11,13,16,19-hexaoxatricosane (common names: butylcarbitol formal and Cryoflex). GRA

N83-30485*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SPACE ENVIRONMENTAL EFFECTS ON MATERIALS
Darrel R. Tenny, George F. Sykes, and David E. Bowles *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 24 p refs Previously announced as A83-14125 (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01 CSCL 07B

N83-30487# Royal Aircraft Establishment, Farnborough (England).
ELECTROSTATIC DISCHARGING BEHAVIOUR OF KAPTON AND OTHER DIELECTRIC MATERIALS IN A SIMULATED SPACE ENVIRONMENT
A. A. Dollery and D. Verdin (Atomic Energy Research Estab.) *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 16 p refs (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01

N83-30496# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany).
THERMAL CYCLING TESTS ON MATERIALS AND COMPONENTS FOR SPACE APPLICATIONS
H. Hamacher, W. Ley, and K.-V. Rehmann *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 9 p refs (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01

N83-31172 Hochschule der Bundeswehr, Hamburg (West Germany).
PROTECTION AGAINST LIGHTNING SURGE VOLTAGES ON COMMUNICATION LINES AND POWER LINES
J. L. TerHaseborg and H. Trinks (Technische Univ., Hamburg) *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 6 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

24 COMPOSITE MATERIALS

Includes laminates.

N83-30522*# Avco Corp., Nashville, Tenn.
ADVANCED COMPOSITE AILERON FOR L-1011 TRANSPORT AIRCRAFT: AILERON MANUFACTURE Final Report
E. G. Dunning, W. L. Cobbs, and R. L. Legg Jun. 1981 60 p ref
(Contract NAS1-15069)

(NASA-CR-165718; NAS 1.26:165718; AV-R-1147) Avail: NTIS HC A04/MF A01 CSCL 11D

The fabrication activities of the Advanced Composite Aileron (ACA) program are discussed. These activities included detail fabrication, manufacturing development, assembly, repair and quality assurance. Five ship sets of ailerons were manufactured. The detail fabrication effort of ribs, spar and covers was accomplished on male tools to a common cure cycle. Graphite epoxy tape and fabric and syntactic epoxy materials were utilized in the fabrication. The ribs and spar were net cured and required no post cure trim. Material inconsistencies resulted in manufacturing development of the front spar during the production effort. The assembly effort was accomplished in subassembly and assembly fixtures. The manual drilling system utilized a dagger type drill in a hydraulic feed control hand drill. Coupon testing for each detail was done. R.J.F.

N83-30523# Aeronautical Research Labs., Melbourne (Australia).
LECTURES ON COMPOSITE MATERIALS FOR AIRCRAFT STRUCTURES
B. C. Hoskin, ed. and A. A. Baker, ed. Oct. 1982 268 p refs Lectures held in Melbourne, Australia, Nov. 1981
(ARL-Struct-Rept-394; ARL-Mat-Rept-114; AR-002-919) Avail: NTIS HC A12/MF A01

A broad introduction to the technology of composite materials for aircraft structural applications was presented. Topics covered included: the basic theory of fiber reinforcement; material characteristics of the commonly used fiber, resin, and composite systems; component form and manufacture; structural mechanics of composite laminates; joining composites; environmental effects, durability and damage tolerance; repair procedures; aircraft applications; and airworthiness considerations. For individual titles, see N83-30524 through N83-30537.

N83-30524# Aeronautical Research Labs., Melbourne (Australia).
INTRODUCTION TO LECTURES ON COMPOSITE MATERIALS FOR AIRCRAFT STRUCTURES
B. C. Hoskin *In its* Lectures on Composite Mater. for Aircraft Struct. Oct. 1982 p 1-12 refs (For primary document see N83-30523 19-24)
Avail: NTIS HC A12/MF A01

A major development in aeronautics, which came to the fore especially over the past decade or so, was the use of composite materials in place of metals in aircraft structures. In general, a composite material is defined simply as a material which consists of two (or more) identifiably distinct constituent materials. The composite materials used for aircraft structures belong to the class known as fiber composites (or sometimes, fiber reinforced plastics) comprising continuous fibers embedded in a resin (or plastic) matrix. It is the fibers which provide such a composite with its key structural properties, the matrix serving mainly to bond the fiber into a structural entity. The prime reason for using composite materials is that substantial weight savings are achieved because of their superior strength to weight and stiffness to weight ratios, as compared with the conventional materials of aircraft construction such as the aluminum alloys. Weight savings of the order of 25% are generally considered to be achievable using current composites in place of metals. Author

N83-30525# Aeronautical Research Labs., Melbourne (Australia).
BASIC PRINCIPLES OF FIBRE COMPOSITE MATERIALS
A. A. Baker and A. W. Rachinger *In its* Lectures on Composite Mater. for Aircraft Struct. Oct. 1982 p 13-44 refs (For primary document see N83-30523 19-24)
Avail: NTIS HC A12/MF A01

A fiber composite material usually consists of one or more filamentary phases embedded in a continuous matrix phase. The aspect ratio (i.e., ratio of length to diameter) of the filaments may vary from about 10 to infinity (for continuous fibers). Their scale, in relation to the bulk material, may range from microscopic (e.g., 8 micrometers diameter graphite fibers in an epoxy matrix) to gross macroscopic (e.g., 25mm diameter steel tendons in concrete). These lectures are concerned mainly with continuous fiber which have diameters in the microcopic range. Composite constituents (fiber and matrices) are conveniently classified according to their moduli and ductilities. Within the composite, the fiber may, in general, be in the form of continuous fibers, discontinuous fibers or whiskers and may be aligned to varying degrees, or randomly oriented. The systems of particular interest here at in the brittle fiber/brittle matrix category with the fibers being very much stiffer and stronger than the matrix. These include aramid/epoxy, boron/epoxy, glass/epoxy and graphite/epoxy. Author

N83-30526# Aeronautical Research Labs., Melbourne (Australia).
FIBRE SYSTEMS
J. G. Williams *In its* Lectures on Composite Mater. for Aircraft Struct. Oct. 1982 p 45-55 refs (For primary document see N83-30523 19-24)
Avail: NTIS HC A12/MF A01

The density of a material is of importance when considering its possible value as a reinforcing fiber. In many applications, the final weight is a dominant factor. This is expecially true of aerospace applications and is gaining significance in some land based uses. The density of a material is a function of the atomic number of the constituent atoms. Light fiber are therefore generally based on elements or groups of elements with low atomic number including C,N,O,Be,B and Si. Of these, even glass, basically Si and O, is considered heavy with a specific gravity of around 2.4-2.5. The principal materials from which fiber are at present produced economically for use in composites requiring high strength and stiffness are: silica-based glass - electrical grade (E-glass), high strength grade (S-glass); carbon - graphitized grades; boron; and aromatic polyamides - aramids. Author

N83-30527# Aeronautical Research Labs., Melbourne (Australia).
RESIN SYSTEMS
J. G. Williams *In its* Lectures on Composite Mater. for Aircraft Struct. Oct. 1982 p 56-67 refs (For primary document see N83-30523 19-24)
Avail: NTIS HC A12/MF A01

The matrix in a composite serves three main functions. It holds the fiber together; it distributes load between fibers; and it protects the fibers from the environment. The ideal material from which a matrix is derived should be, initially, a low viscosity liquid which is converted readily to a tough durable solid, adequately bonded to the reinforcing fiber. While the function of the fibrous reinforcement is to carry the load in the composite, the mechanical properties of the matrix can significantly affect the way, and the efficiency with which, the fibers operate. For example, in a fiber bundle in the absence of matrix, the straightest fibers bear a high proportion of the load. The matrix causes the stress to be distributed more evenly between all fibers by causing all fibers to suffer the same strain. The stress is transmitted by a shear process which requires good bonding between fiber and matrix and also high shear strength and modulus for the matrix itself. Author

N83-30528# Aeronautical Research Labs., Melbourne (Australia).
COMPOSITE SYSTEMS
M. J. Davis and A. W. Rachinger *In its* Lectures on Composite Mater. for Aircraft Struct. Oct. 1982 p 68-85 refs (For primary document see N83-30523 19-24)
Avail: NTIS HC A12/MF A01

Micromechanical analyses were used to predict composite properties from a knowledge of constituent properties and from an understanding of the fiber/matrix interactions in the composite state. It is important to realize however, that such analyses are approximate because they rely on much simplified models of very complex systems. Micromechanical analyses alone are not sufficient for design purposes, and mechanical testing data from real composite materials are required. Therefore, considerable emphasis is placed on testing procedures. The elastic constants and strength values required for designing laminates are presented, the testing procedures for their determination are discussed, and the importance of the generally anisotropic nature of composites in the context of mechanical testing is demonstrated. Selected mechanical properties of several composite systems are discussed

and compared with those of more conventional aircraft materials, and finally the novel technique of hybridization of composites is introduced. Author

N83-30529# Aeronautical Research Labs., Melbourne (Australia).
COMPONENT FORM AND MANUFACTURE
A. A. Baker *In its* Lectures on Composite Mater. for Aircraft Struct. Oct. 1982 p 86-108 refs (For primary document see N83-30523 19-24)
Avail: NTIS HC A12/MF A01

Fiber reinforcement is essentially a one dimensional strengthening process. Since most components are stressed in more than one direction a major function of the forming procedure is to orient the fibers, in the matrix, in the appropriate directions and proportions to obtain the desired mechanical properties. The forming process must also produce the shape of the component and develop the required properties of the matrix. In an ideal fibrous structure the fibers are aligned with the trajectories of principal stress and are concentrated in direct proportion to the local magnitude of the stress. This ideal is approached only by natural materials such as wood and bone. The various manufacturing procedures for fibers reinforced plastics are classified according to the form of the reinforcement. At least in principle, all of the procedures based on continuous fibers (and some of the procedures based on discontinuous fibers) allows close tailoring of mechanical properties. These procedures, particularly those based on laminating, are used for manufacturing aircraft components from glass/epoxy, graphite/epoxy, aramid/epoxy and boron/epoxy. Author

N83-30530# Aeronautical Research Labs., Melbourne (Australia).
STRUCTURAL MECHANICS OF FIBRE COMPOSITES
B. C. Hoskin and B. I. Green *In its* Lectures on Composite Mater. for Aircraft Struct. Oct. 1982 p 109-133 refs (For primary document see N83-30523 19-24)
Avail: NTIS HC A12/MF A01

The determination of the stresses, strains and deformation in fiber composite structures is outlined. Attention is concentrated on structures made in the form of laminates because that is the way composite materials are generally utilized. From the structural mechanics viewpoint, the novel features of composites, compared with conventional structural materials such as metals, are their marked anisotropy and, when used as laminates, their macroscopically heterogeneous nature. However, it should be remarked that there is one classical structural material, namely wood, which is also both anisotropic and, when used in the form of ply-wood, macroscopically heterogeneous. In fact, much of the theory that is needed in the analysis of composite structures is simply an extension of the theory already used for wooden structures. Author

N83-30531# Aeronautical Research Labs., Melbourne (Australia).
JOINING ADVANCED FIBRE COMPOSITES
A. A. Baker *In its* Lectures on Composite Mater. for Aircraft Struct. Oct. 1982 p 134-161 refs (For primary document see N83-30523 19-24)
Avail: NTIS HC A12/MF A01

Most structures consist of an assembly of a number of individual elements connected to form a load transmission path. These connections or joints are potentially the weakest points in the structure and determine its viability. For example, in aircraft structures, where minimization of weight is important, many of the allowable loads are determined by the strength of the joints. Joining of advanced fiber composites, particularly graphite/epoxy, for aircraft applications where the joints are not subjected to significant bending moments are presented. In general, it is desirable to minimize the number of joints in a structure to minimize both its weight and cost. Fiber composites have an important advantage over metals in this respect, since large one piece components are readily produced. Nevertheless, joints will be required to transmit loads in and out of the composite structure. Usually joints employing metallic members, either aluminium or titanium alloys, are used for this purpose. Author

N83-30532# Aeronautical Research Labs., Melbourne (Australia).
ENVIRONMENTAL EFFECTS AND DURABILITY
B. C. Hoskin *In its* Lectures on Composite Mater. for Aircraft Struct. Oct. 1982 p 162-174 refs (For primary document see N83-30523 19-24)
Avail: NTIS HC A12/MF A01

Key factors which influence the performance of composite aircraft structures in service are discussed. These include environmental effects, especially the effect of moisture absorption from the atmosphere taken in conjunction with elevated temperatures such as are encountered by an aircraft structure in high speed flight, and the effect of cyclic (fatigue) loads. Bearing in mind that metal aircraft structures were in widespread use for almost half a century and that significant uncertainties still exist there in the general areas of environmental effects and fatigue performance, it is hardly considered surprising that significant uncertainties exist in these same areas for composite aircraft structures, where there is so much less experience. Another aspect which compounds the uncertainties for composites is the presence of additional parameters, which have no analog for metals, and which can affect performance, e.g., the ply orientations and stacking sequence for a laminate. It is usual practice, when assessing environmental effects and fatigue performance for design purposes, to establish a relatively large data base for the particular laminate patterns it is intended to employ. Author

N83-30533# Aeronautical Research Labs., Melbourne (Australia).
DAMAGE TOLERANCE OF FIBRE COMPOSITE LAMINATES
M. J. Davis and R. Jones *In its* Lectures on Composite Mater. for Aircraft Struct. Oct. 1982 p 175-199 refs (For primary document see N83-30523 19-24)
Avail: NTIS HC A12/MF A01

The term damage tolerance is used to describe a design philosophy for military aircraft whereby a component is designed such that structural integrity is maintained while a defect of a given size is present in the structure. Modern military aircraft made of metallic materials are designed on this basis, using fracture mechanics to predict the size of a tolerable flaw under the applied loads. With high performance composites, the field of damage tolerant design is complex, due to the inhomogeneous nature of the material and the failure modes, which differ significantly from those in metals. Composites exhibit near linear stress strain characteristics up to failure, while most metals display some ductile deformation. Thus, composites are less tolerant of overload. In fatigue, composites again differ from metals in that metals are sensitive to tension dominated fatigue loading, whereas composites generally exhibit good resistance to tension fatigue. Composites are, however, suspectible to local delaminations which may grow under compression fatigue. Author

N83-30534# Aeronautical Research Labs., Melbourne (Australia).
NDI OF FIBRE REINFORCED COMPOSITE MATERIALS
I. G. Scott and C. M. Scala *In its* Lectures on Composite Mater. for Aircraft Struct. Oct. 1982 p 200-216 refs (For primary document see N83-30523 19-24)
Avail: NTIS HC A12/MF A01

Non-destructive inspection (NDI) of F-R (fiber-reinforced) composite materials is expected to differ from that of metallic materials because composites themselves differ markedly from metals and their alloys. F-R composites are inhomogeneous and markedly anisotropic, they possess a low thermal conductivity along with a high acoustic attenuation, and they are generally poor conductors of electricity. High performance structures are conventionally made from metallic material which is relatively free from unwanted defects; in-service failures tend to originate from crack initiation at identifiable defects and occur after crack propagation. Hence NDI procedures are based on the detection/location of growing cracks, the importance of which is determined using fracture mechanics. No similar predominant failure process was yet identified for composite material, no procedure similar to fracture mechanics was developed and many of the NDI needs are as yet not clearly defined. Author

N83-30535# Aeronautical Research Labs., Melbourne (Australia).
REPAIR OF GRAPHITE/EPOXY COMPOSITES
A. A. Baker *In its* Lectures on Composite Mater. for Aircraft Struct. Oct. 1982 p 217-242 refs (For primary document see N83-30523 19-24)
Avail: NTIS HC A12/MF A01

Graphite/epoxy composites have many advantages for use as aircraft structural materials, including their high specific strength and stiffness, resistance to damage by fatigue loading and their immunity to corrosion. Thus, extensive use of these composites should reduce the high maintenance costs associated with repair of corrosion damage normally encountered with conventional aluminum alloys, particularly those exposed in a marine environment. Similarly, costs associated with repair of damage due to fatigue should also be substantially reduced, since the composites do not in general suffer from the cracking encountered with metallic structures, particularly cracking resulting from fretting around fastener holes or from corrosion pitting. However, maintenance costs associated with repair of service contact damage is expected to increase, since graphite/epoxy is essentially an unforgiving brittle material - unable to yield plastically under overload. Even quite modest impacts (by metallic standards) can lead to internal damage in the form of delaminations, which may result in a marked strength reduction particularly under compression loading. Author

N83-30536# Aeronautical Research Labs., Melbourne (Australia).
AIRCRAFT APPLICATIONS
B. C. Hoskin and A. A. Baker *In its* Lectures on Composite Mater. for Aircraft Struct. Oct. 1982 p 243-252 refs (For primary document see N83-30523 19-24)
Avail: NTIS HC A12/MF A01

As already described in the first lecture, composite materials, especially graphite/epoxy, are being used to a significant extent in present day aircraft and all the signs are that this use will increase. The nature of some of these applications is discussed further and an indication given of what seem to be the general design rules that are evolving. Also, some matters that need special attention for composite structure (such as lightning protection and erosion protection) are touched on. Brief mention is made of composite applications in helicopter construction.
Author

N83-30537# Aeronautical Research Labs., Melbourne (Australia).
AIRWORTHINESS CONSIDERATIONS
B. C. Hoskin *In its* Lectures on Composite Mater. for Aircraft Struct. Oct. 1982 p 253-262 refs (For primary document see N83-30523 19-24)
Avail: NTIS HC A12/MF A01

The use of composite materials raises some problems which are different to those for metal aircraft structures. These problems, in turn, raise questions about specific airworthiness requirements for composite aircraft structures. At this state, few such formal specific requirements exist. As an example, consider the matter of the effect of the moisture/temperature environment on structural performance. Although the US Military Standard on Aircraft Structural Integrity states that the standard applies to metallic and non-metallic structures, and although the US Military Handbook details general design procedures for composite structures, neither document specifies a procedure for allowing for environmental effects in the structural integrity program, including the static and fatigue tests on full scale articles. Airworthiness requirements for UK military aircraft containing composite structure only exist in draft form. Author

N83-30538*# National Aeronautics and Space Administration, Washington, D. C.
INCOMBUSTIBLE RESIN COMPOSITION
Toshio Akima Aug. 1982 7 p Transl. into ENGLISH of Japanese Patent no. 51-57745 (18 Nov. 1974) p 239-241 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-77108; NAS 1.15:77108) Avail: NTIS HC A02/MF A01 CSCL 11D

Incombustible resin compositions composed of aromatic compounds were obtained through (1) combustion polymer material and (2) bisphenol A or halogenated bisphenol A and bisphenol A diglycidl ether or halogenated bisphenol A diglycidyl ether. The aromatic compound is an adduct of bifunctional phenols and bifunctional epoxy resins. Author

N83-30539*# Rockwell International Corp., Downey, Calif.
GRAPHITE/LARC-160 TECHNOLOGY DEMONSTRATION SEGMENT TEST RESULTS
William H. Morita and Stanley R. Graves Jun. 1983 124 p refs (Contract NAS1-15371)
(NASA-CR-172123; NAS 1.26:172123) Avail: NTIS HC A06/MF A01 CSCL 11D

A structural test program was conducted on a Celion/LARC-160 graphite/polyimide technology demonstration segment (TDS) to verify the technology. The 137 x 152 cm (54 x 60 in.) TDS simulates a full-scale section of the orbiter composite body flap design incorporating three ribs and extending from the forward cove back to the rear spar. The TDS was successfully subjected to mechanical loads and thermal environments (-170 to 316 C) simulating 100 shuttle orbiter missions. Successful completion of the test program verified the design, analysis, and fabrication methodology for bonded Gr/PI honeycomb sandwich structure and demonstration that Gr/PI composite technology readiness is established. M.G.

N83-30540# Southwest Research Inst., San Antonio, Tex. Dept. of Materials Sciences.
STUDY OF FATIGUE MECHANISMS IN AEROSPACE STRUCTURAL MATERIALS Final Scientific Report, 1 Jan. 1978 - 31 Dec. 1982
James Lankford, David L. Davidson, and Gerald R. Leverant Feb. 1983 78 p refs
(Contract F49620-78-C-0022; AF Proj. 2306)
(AD-A126875; AFOSR-83-0207TR; SwRI-06-5159) Avail: NTIS HC A05/MF A01 CSCL 11/4

This report summarizes the results of a five-year, three-phase study of (1) fatigue crack growth and load interaction modeling in aluminum alloys, (2) the effect of microstructure on susceptibility to hydrogen embrittlement in titanium alloys, and (3) micromechanisms of fatigue crack growth in titanium matrix composites. Author (GRA)

N83-30541# Tetra Tech, Inc., Arlington, Va.
ACOUSTIC NDE OF MULTILAYERED COMPOSITES. PHASE 2: ANGLE BEAM MODEL VALIDATION AND INSPECTION OF BRONZE-RUBBER STRUCTURES Final Technical Report, Jul. 1982 - Jan. 1983
Ramesh Shankar and Stephen S. Lane Mar. 1983 54 p refs
(Contract N60921-81-C-0300)
(AD-A127253; TETRAT-TC-6139) Avail: NTIS HC A04/MF A01 CSCL 14/2

A model for the response of layered structures to off-normal ultrasonic pulses was validated by modifying the computer model developed under Phase 1 of this contract. For angle beams, the responses have different magnitude and phases, and include different modes of propagation, unlike the case for normal-incidence beams investigated under Phase 1. The model-simulated reflection series was compared with ultrasonic digital data collected from a bronze-epoxy-aluminum structure. The response from the different interfaces and for different transit paths were validated for their transit time, mode of propagation and relative magnitude and phase. Ultrasonic digital data were collected under flaw and no-flaw conditions. The data were processed and the flaw and no-flaw signals were clearly separable. GRA

N83-30542# Texas Univ., Austin. Dept. of Materials Science and Engineering.
TITANIUM MATRIX/CONTINUOUS FIBER COMPOSITE INTERFACE INTERACTIONS AND THEIR INFLUENCE ON MECHANICAL PROPERTIES Annual Technical Report, 1 Jan. - 31 Dec. 1982

Harris L. Marcus 25 Feb. 1983 74 p refs
(Grant AF-AFOSR-0052-80; AF Proj. 2306)
(AD-A127402; AFOSR-83-0243TR; UTMSE-83-2) Avail: NTIS HC A04/MF A01 CSCL 11/4

The effect of the fatigue crack growth behavior of the SiC and B4C/B reinforced titanium-6 aluminum-4 vanadium metal matrix composites by the modification of the interface between the fiber and the matrix by isothermal and thermal fatigued treatments was studied. The thermal cycling and isothermal treatments were carried out in environments of vacuum, air and sulfur. One and two dimensional analysis of sulfur and oxygen diffusion indicated that the interface has a thin but finite thickness and is a high diffusion path for sulfur and oxygen. Thermal cycling treatment enhanced the interface diffusion. The fatigue crack growth results demonstrated that the interface transferred the load during fatigue cycling in either an invert environment or if the interface has a minimal amount of impurities. In the case of the sulfur enriched interface the humid air, FCG environment reduced the cohesion of the interface with the load totally carried by the matrix. This led to an increased FCG range with a higher value of the Paris exponent. Without the enhanced sulfur at the interface the Paris exponent remained constant although the fatigue crack growth rate in dry hydrogen was lower than in the humid air but greater than in dry nitrogen for all conditions. GRA

N83-30488# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
CANDIDATE MATERIALS FOR PRETENSIONED MEMBRANES OF FIBRE COMPOSITE MATERIALS FOR SPACE APPLICATION
W. Buchs *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 6 p refs (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01

N83-30484# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
THE EFFECT OF SPACE ENVIRONMENT ON THE THERMAL DISTORTION OF POLYMER MATRIX COMPOSITES
R. C. Tennyson, G. E. Mabson, and S. Ahmed (Communication Research Centre) *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 14 p refs Sponsored in part by Communication Research Centre of Canada (For primary document see N83-30479 19-12)
(Grant AF-AFOSR-3694-78)
Avail: NTIS HC A10/MF A01

N83-30749# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
LARGE DEFLECTION RANDOM RESPONSE OF SYMMETRIC LAMINATED COMPOSITE PLATES
K. R. Wentz, D. B. Paul, and C. Mei (Old Dominion Univ.) *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52, Part 5 May 1982 p 99-111 refs (For primary document see N83-30740 19-31)
Avail: NTIS HC A08/MF A01 CSCL 11/4

N83-30781# San Diego State Univ., Calif. Coll. of Engineering.
DYNAMIC STABILITY OF FIBROUS COMPOSITE CYLINDERS UNDER PULSE LOADING
Robert J. Stuart and Sangiahnadar Dharmarajan *In* Shock and Vibration Bulletin, no. 50, part 3 Sep. 1980 p 21-26 refs (For primary document see N83-30778 19-31)
Avail: NTIS HC A10/MF A01 CSCL 11/4

N83-30782# Oklahoma Univ., Norman.
TRANSFER-MATRIX ANALYSIS OF DYNAMIC RESPONSE OF COMPOSITE-MATERIAL STRUCTURAL ELEMENTS WITH MATERIAL DAMPING
M. M. Wallace and C. W. Bert *In* Shock and Vibration Bull., No. 50, Part 3 Sep. 1980 p 27-38 refs (For primary document see N83-30778 19-31)
Avail: NTIS HC A10/MF A01 CSCL 11/4

N83-30795# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. Dept. of Aeronautics and Astronautics.
MATERIAL DAMPING AS A MEANS OF QUANTIFYING FATIGUE DAMAGE IN COMPOSITES
Peter J. Torvik and Cynthia Bourne *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50, Part 4 Sep. 1980 p 1-12 refs (For primary document see N83-30794 19-31)
Avail: NTIS HC A11/MF A01 CSCL 11/4

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N83-30543# British Gas Corp., London (England).
NEWLY DEVELOPED SYSTEM TO BE INTRODUCED INTO HIGH TEMPERATURE HEATING PROCESS
1983 10 p Transl. into ENGLISH of technical report no. 1 Osaka Gas, Japan, Oct. 1982
(T6093/BG/LRS/LRST638/83; BLL-BG-Trans-6093-(9022.048))
Avail: British Library Lending Div., Boston Spa, Engl.

The Oxygen Enriched Combustion System consists of an oxygen enriching membrane, a suction pump and a gas burner. The oxygen enriching membrane is constructed in the form of a flat cell, and according to the number of cells employed, the volume of the oxygen enriched air obtained can be varied. The suction pump draws the oxygen enriched air through the membrane cells by reducing the pressure at the membrane cell to about 160 mmHg abs, and delivers the oxygen enriched air to the gas burner.
Author

N83-30544 Prins Maurits Lab. TNO, Rijswijk (Netherlands).
QUANTITATIVE ANALYSIS OF CO2, CO, H2O AND FREON 12 WITH THE MIRAN-80 INFRARED GAS ANALYZER
W. H. Dekker Mar. 1983 37 p In DUTCH; ENGLISH summary
(Contract A78/KM/118)
(PML-1982-40; TDCK-77221) Copyright. Avail: Issuing Activity

The suitability of the MIRAN 801 gas analyzer for monitoring the air in submarines was assessed, using measurement results for mixtures of CO2, CO, H2O and freon 12, obtained by the spectrometrically similar MIRAN 80 analyzer. For the automatic calculation of the concentrations from measured extinctions, the MIRAN-80 uses one of the equations $C = aE$ or $C = aE + b$, C being the concentration of a gas, E the extinction at a wavelength specific for that gas and a and b constants to be determined by calibration. However, the relation between extinction and concentration is not linear, so errors in the calculation of concentrations often exceed 100% at low concentrations. It is shown that, using a well-chosen calibration procedure, accurate warning can be achieved. A method which calculates concentrations with relative error $< 10\%$ over the whole concentration range is presented. Author (ESA)

N83-30545# Junta de Energia Nuclear, Madrid (Spain). Div. de Quimica y Medio Ambiente.
IMPROVEMENTS IN THE EQUIPMENT FOR DETERMINATION OF Kr-85 WITH THE REFERENCE METHOD
MaC. HerasInigues and MaM. PerezGarcia 1983 15 p refs In SPANISH; ENGLISH summary
(JEN-529; ISSN-0081-3397; ISBN-84-500-8561-6) Avail: NTIS HC A02/MF A01

Equipment for Kr-85 separation and cryogenic chromatographic concentration is described, which presents some advantages over the reference equipment. The experimental apparatus, made with metalic elements presents easier control, faster chromatographic separations and without the loss of efficiency and reproducibility. The concentration and separation procedure for Kr-85 and a comparative study between both apparatus are

described. The efficiency of the method is obtained experimentally. A.R.H.

N83-30546# Junta de Energia Nuclear, Madrid (Spain). Div. de Medio Ambiente.
ANALYTICAL METHOD OF Kr-85 DETERMINATION, USING CRYOGENIC CONCENTRATION AND SEPARATION AND LIQUID SCINTILLATION COUNTING
MaC. HerasIniguez, MaM. PerezGarcia, and A. GrauMalonda 1983 45 p refs In SPANISH; ENGLISH summary
(JEN-528; ISSN-0081-3397; ISBN-84-500-8560-8) Avail: NTIS HC A03/MF A01

A laboratory method for determining Kr-85 levels in gaseous effluents of nuclear power and in the atmosphere is described. Samples of air, collected in metallic cylinders, are introduced into a gas solid chromatographic separation system which resolves Kr from the other air components. The separated Kr is dissolved in a toluene based scintillation cocktail, and the Kr-85 content is determined by liquid scintillation counting. Author

N83-30547# Materials Research Labs., Melbourne (Australia).
POTASSIUM BENZOATE FOR PYROTECHNIC WHISTLING COMPOSITIONS: ITS SYNTHESIS AND CHARACTERIZATION AS AN ANHYDROUS SALT
D. J. Whelan and P. P. Elischer Feb. 1983 27 p refs
(MRL-R-871; AR-003-060) Avail: NTIS HC A03/MF A01

Potassium benzoate is one of the ingredients in the formulation SR 136 Whistling Composition. However, some ambiguity exists in the chemical literature as to its hydration state. It is established that potassium benzoate crystallizes from water as colorless plates containing no water of crystallization and it does not appear to take up water from its environment. Its differential scanning calorimetry thermogram, over the temperature range 310 K - 750 K, consists of a single, sharp and symmetrical endotherm, occurring near 714 K and probably due to melting, the heat of this reaction being ca 213 J g(-1) (50.9 cal g(-1)). It can be prepared from stoichiometric amounts of benzoic acid and either potassium hydroxide or potassium bicarbonate. R.J.F.

N83-30548*# Argonne National Lab., Ill.
EXPERIMENTAL GAS-FIRED PULSE-COMBUSTION STUDIES
C. A. Blomquist Sep. 1982 313 p refs Sponsored by NASA
(Contract W-31-109-eng-38)
(NASA-CR-172827; NAS 1.26:172827; DE83-009753; ANL/EES-TM-214) Avail: NTIS HC A14/MF A01 CSCL 07D

Experimental studies conducted at Argonne National Laboratory on a gas-fired, water-cooled, Helmholtz-type pulse combustion burner are discussed. In addition to the experimental work, information is presented on the evolution of pulse combustion, the types of pulse combustion burners and their applications, and the types of fuels used. Also included is a survey of other pertinent studies of gas-fired pulse combustion. The burner used in the Argonne research effort was equipped with adjustable air and gas flapper valves and was operated stably over a heat-input range of 30,000 to 200,000 Btu/h. The burner's overall heat transfer in the pulsating mode was 22 to 31% higher than when the unit was operated in the steady mode. Important phenomena discussed include (1) effects on performance produced by inserting a corebustor to change tailpipe diameter, (2) effects observed following addition of an air-inlet decoupling chamber to the unit, and (3) occurrence of carbon monoxide in the exhaust gas. DOE

N83-30549*# National Aeronautics and Space Administration, Washington, D. C.
METHOD FOR PRODUCING HEAT-RESISTANT SEMI-INORGANIC COMPOUNDS
S. Yajima, K. Okamura, T. Shishido, and Y. Hasegawa May 1983 19 p Transl. into ENGLISH of German Patent no. 2918549 (9 May 1979) p 1-21 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77251; NAS 1.15:77251) Avail: NTIS HC A02/MF A01 CSCL 07B

The method for producing a heat resistant, semi-inorganic compound is discussed. Five examples in which various alcohols, phenols, and aromatic carbonic acids are used to test heat resistance and solubility are provided. Author

N83-30550*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ACTIVATION PARAMETERS OF FLOW THROUGH BATTERY SEPARATORS
Ratan L. Blokhra (Himachal Pradesh Univ., Simla, India) May 1983 15 p refs
(NASA-TM-83371; E-1637; NAS 1.15:83371) Avail: NTIS HC A02/MF A01 CSCL 10C

Studies of the hydrodynamic flow of water and 45 percent potassium hydroxide (KOH) solution through a microporous and an ion exchange separator are described. The permeability values are interpreted in terms of a pseudoactivation process. The enthalpy of activation deltaH* and the entropy of activation deltaS* were estimated from Eyring's rate equation. Author

N83-30551*# Pratt and Whitney Aircraft Group, East Hartford, Conn. Commercial Engineering.
BROAD SPECIFICATION FUELS TECHNOLOGY PROGRAM, PHASE 1 Final Report
R. P. Lohmann and R. A. Jeroszko 11 Oct. 1982 210 p refs (Contract NAS3-22392)
(NASA-CR-168180; NAS 1.26:168180; PWA-5719-34) Avail: NTIS HC A10/MF A01 CSCL 21B

An experimental evaluation was conducted to assess the impact of the use of broadened properties fuels on combustor design concepts. Emphasis was placed on establishing the viability of design modifications to current combustor concepts and the use of advanced technology concepts to facilitate operation on Experimental Referee Broad Specification (ERBS) fuel while meeting exhaust emissions and performance specifications and maintaining acceptable durability. Three different combustor concepts, representative of progressively more aggressive technology levels, were evaluated. When operated on ERBS rather than Jet A fuel, a single stage combustor typical of that in the most recent versions of the JT9D-7 engine was found to produce excess carbon monoxide emissions at idle and elevated liner temperatures at high power levels that were projected to reduced liner life by 13 percent. The introduction of improved component technology, such as refined fuel injectors and advanced liner cooling concepts were shown to have the potential of enhancing the fuel flexibility of the single stage combustor. Author

N83-30552# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. Dept. of Nuclear Engineering.
EXAMINATION OF THE FEASIBILITY OF DETECTION OF CALCIUM EVAPORATION FROM A TYPE B DISPENSER CATHODE BY LASER INDUCED PHENOMENA M.S. Thesis
Virginia Louise Eason Mar. 1983 74 p refs
(AD-A127357; AFIT/GNE/PH/83M-6) Avail: NTIS HC A04/MF A01 CSCL 07/4

Three methods, laser induced resonance fluorescence, excitation to a shorter lived level from a metastable level, ionization spectroscopy are examined for feasibility of detecting and measuring calcium evaporation from a type of cathode. Laser induced fluorescence is the most promising and the easiest to implement. Ionization of the calcium atoms after they have been excited by a laser to the metastable 3P1 state is feasible but require redesign of extant equipment to implement. Excitation to a shorter lived level from the metastable 3P1 state is feasible for the transition form the 3D2(4435A) level and not feasible for the 3S1 (6122A) transition. Sensitized fluorescence and stimulated emission involving excited calcium atoms is examined and discarded. Calcium evaporation rates are semiquantitatively related to barium evaporation rates. An argument for switching the course of future experiments from evaporation rate vs lifetime studies to evaporation rate vs temperature is made. GRA

N83-30553# Texas Univ., Austin. Dept. of Chemistry.
ELECTROGENERATED CHEMILUMINESCENCE. PART 42: THE ELECTROCHEMISTRY AND ELECTROGENERATED CHEMILUMINESCENCE OF THE TRIS (2,2'-BIPYRAZINE)RUTHENIUM (II) SYSTEM Technical Progress Report, 1 Sep. 1982 - 31 Aug. 1983
Jaime Gonzales-Velasco, Israel Rubinstein, R. J. Crutchley (York Univ.), A. B. Lever (York Univ.), and Allen J. Bard 31 Mar. 1983 29 p refs Submitted for publication Sponsored in part by the Comite Hispano-Norteamericano de Cooperacion Cientifica y Tecnica
(Contracts N00014-78-C-0592; DAAG29-82-K-0006; NR Proj. 051-693)
(AD-A126894; TR-29) Avail: NTIS HC A03/MF A01 CSCL 07/4

The electrochemical behavior and electrogenerated chemiluminescence (ecl) of of Ru(bpz)3(2+) (as the PF6salt) in acetonitrile solutions was investigated. Oxidation to the +3 form and reduction to the +1, 0, -1 and -2 forms occur at potentials about 0.5V more positive than the corresponding bipyridine complex. Emission characteristic of Rub(bpz)3(2+) is produced upon the electron transfer reaction between the +3 and +1 species. Weak emission also results from reaction of the +3 species with solvent or impurities. Author (GRA)

N83-30554# Purdue Univ., Lafayette, Ind. Dept. of Chemistry.
OBSERVATION OF A REVERSIBLE ADSORBED REDOX COUPLE USING SURFACE-ENHANCED RAMAN SCATTERING: PENTAAMMINEPYRIDINEOSMIUM(III)/(II) AT SILVER ELECTRODES
Stuart Farquharson, Michael J. Weaver, Peter A. Lay, Roy H. Magnuson, and Henry Taube Mar. 1983 12 p refs
(Contract N00014-83-K-0086; Grants NSF CHE-79-08633; GM-13638-17)
(AD-A127177; TR-15) Avail: NTIS HC A02/MF A01 CSCL 07/4

Surface-enhanced Raman scattering (SERS) has been observed for pentaamminepyridineosmium(III) adsorbed at a silver electrode as a function of electrode potential in order to examine the molecular vibrational changes of electrode potential in order to examine the molecular vibrational changes accompanying electron transfer involving a simple surface-bound redox couple. Noticeable alterations in the intensity and frequency of several vibrational bands involving osmium-ligand and pyridine ring modes were observed as the electrode potential was made more negative which are consistent with a variation of the osmium oxidation state from III to II. The effective formal potential for the adsorbed Os(III)/(II) couple determined from SERS, ca -630 mV vs sce, is in reasonable agreement with that obtained from rapid cyclic voltammetry, illustrating the value of SERS for monitoring electron-transfer processes at metal surfaces. Author (GRA)

N83-30555# Naval Postgraduate School, Monterey, Calif. Dept. of Aeronautics.
AN EXPERIMENTAL INVESTIGATION OF THE COMBUSTION BEHAVIOR OF SOLID FUEL RAMJETS M.S. Thesis
Grant Allan Begley, Jr. Dec. 1982 34 p refs
(AD-A127165) Avail: NTIS HC A03/MF A01 CSCL 21/2

Limited experimental data indicated that fuel vapor composition within the SFRJ combustor may have a significant effect on the obtainable combustion efficiency and upon the dependence of combustion efficiency upon equivalence ratio and air mass flow rate. Combustor pressure oscillations in bypass operation were found to increase regression rates when using PMM fuel grains and to increase or decrease combustion efficiency depending upon equivalence ratio. GRA

N83-30556# Spelman Coll., Atlanta, Ga. Dept. of Chemistry.
STUDY OF THE INTERACTION OF HYDRAZINE, METHYLHYDRAZINE, AND UNSYM-DIMETHYLHYDRAZINE WITH PORPHYRINS, METALLOPORPHYRINS AND SOME METAL COORDINATION COMPOUNDS Final Report
Albert N. Thompson, Jr. Jan. 1983 8 p
(Grant AF-AFOSR-0137-82; AF Proj. 2303)
(AD-A126904; AFOSR-83-0219TR) Avail: NTIS HC A02/MF A01 CSCL 07/3

Trisodium pentacyanoferrate (TPF) forms derivatives with hydrazine, methylhydrazine, and unsym-dimethylhydrazine. Each of these derivatives are similar in color and each of the derivatives have similar visible spectra. Separation of these derivatives by HPLC could offer a rapid analytical method of determining the composition of mixtures of the hydrazines. The photoreduction of Zn-tetraphenylporphyrin (Zn-TPP) with hydrazine, methylhydrazine, and unsym-dimethylhydrazine in pyridine was investigated. Results indicate that the presence of hydrazine in mixture with methylhydrazine, and unsym-dimethylhydrazine can be confirmed due to the formation of a unique color that is not produced when Zn-TPP is photoreduced with methylhydrazine, and unsym-dimethylhydrazine. Organometallic compounds more sensitive to reduction by hydrazine and porphyrin derivatives that may possibly form hydrazone derivatives with hydrazine are currently being investigated. Author (GRA)

N83-30557# California Univ., Berkeley. Lawrence Berkeley Lab. Energy and Environment Div.
COMPUTER CONTROL OF ELECTROCHEMICAL EXPERIMENTS WITH APPLICATION TO ZINC/NICKEL OXIDE CELLS M.S. Thesis
M. H. Katz, F. R. McLarnon, and E. J. Cairns Dec. 1982 453 p refs
(Contract DE-AC03-76SF-00098)
(DE83-009132; LBL-15546) Avail: NTIS HC A20/MF A01

A computer-controlled test system was designed and constructed to allow the simultaneous and continuous cycling of 16 or more electrochemical cells. The system offers resolution and stability within 0.025% of full scale, and response times are typically 1 ms. A wide variety of charge and discharge regimes, including pulsed charge and power discharge profiles, are implemented through various computer algorithms. The software configuration allows two programs to execute concurrently in the computer memory and to communicate with each other through a set of codified messages. This arrangement permits flexible interaction with all experiments and provides on-line data reduction and display. The test system has been employed to investigate the effects of constant current and various pulsed current charging modes on the cycle life and capacity retention of Zn/NiOOH cells cycled at 100% depth of discharge. Test results included cell voltages, potentials of the NiOOH and Zn electrodes versus Hg/HgO reference electrodes, coulombs, watt-hours average voltages, and associated efficiencies. Postmortem tests included Zn electrode X-ray studies. Author

N83-30558# Los Alamos Scientific Lab., N. Mex.
OPTICAL INSTRUMENTATION FOR ON-LINE ANALYSIS OF CHEMICAL PROCESSES
Allen Hartford, Jr., David A. Cremers, Thomas R. Loree, and Gerard P. Quigley 1983 6 p Presented at the SPIE Tech. Symp. East '83, Arlington, Va., 4-8 Apr. 1983
(Contract W-7405-eng-36)
(DE83-007557; LA-UR-83-409; CONF-830420-1) Avail: NTIS HC A02/MF A01

Optical diagnostics provide the capability for noninstrusive, on-line, real time analysis of chemical process streams. Several laser based methods for monitoring fossil energy processes have been evaluated. Among the instrumentation techniques which appear quite promising are coherent anti-Stokes Raman spectroscopy (CARS), laser induced breakdown spectroscopy (LIBS), and synchronous detection of laser induced fluorescence (SDLIF). A CARS diagnostic was implemented on a coal gasifier and was successfully employed to measure species concentrations and temperatures within the process stream. The LIRS approach has been used to identify total trace impurities (e.g., Na, K, and S) within a gasifier. Recently, individual components in mixtures of aromatics hydrocarbons have been resolved via the synchronous detection of laser induced fluorescence. DOE

N83-30559# Case Western Reserve Univ., Cleveland, Ohio.
ROUGHNESS EVOLUTION AND DENDRITIC GROWTH IN ZINC ELECTRODEPOSITION FROM HALIDE ELECTROLYTES Final Report
U. Landau and J. H. Shyu Mar. 1983 153 p refs Sponsored by EPRI
(EPRI Proj. 1198-3)
(DE83-901992; EPRI-EM-2937) Avail: NTIS HC A08/MF A01

Evolution of rough or dendritic surface texture during electrodeposition often restricts the capacity of rechargeable batteries by limiting the thickness of the plated layer, thereby imposing economic and operating limitations on high energy storage systems such as the zinc-halogen batteries. This technologically important phenomenon has so far been treated mostly empirically. A comprehensive model for roughness evolution in electrodeposition, taking into account the combined effects of transport by diffusion and convection, reaction kinetics and the surface energy is reported here. Critical overpotentials and induction times for roughness initiation, and propagation of roughness elements are determined. Morphological stability analysis explains why certain electrodes remain smooth whereas others evolve dendrites, and defines conditions for smooth deposition. Once roughness evolution is indicated, the complete growth history of the nodules is provided in terms of the current density and the applied potential, the convective flow, chemical composition and the macroscopic and microscopic geometry. DOE

N83-30560# Combustion Engineering, Inc., Windsor, Conn.
COMBUSTION ENGINEERING TWO-STAGE, ATMOSPHERIC-PRESSURE, ENTRAINED-FLOW COAL-GASIFICATION-PROCESS DEVELOPMENT-UNIT PROGRAM Final Report
S. L. Darling, R. W. Koucky, and M. C. Tanca Feb. 1983 393 p refs
(Contract DE-AC01-76ET-10204; EPRI Proj. 244-1)
(DE83-009252; EPRI-AP-2846) Avail: NTIS HC A17/MF A01

A program was conducted to design, construct and operate a two stage, atmospheric pressure, entrained flow, low Btu coal gasification process development unit (PDU) having a capacity of 5 tons/h of coal. The program was jointly sponsored by the US Department of Energy, the Electric Power Research Institute, and Combustion Engineering, Inc. The objectives of the program were: (1) to demonstrate the capability and suitability of the process and equipment to produce a clean low Btu gas from coal, and (2) to provide design information for scale up to commercial size plants. During the 3-y PDU test program, beginning in June 1978, a series of 12 runs was conducted. Pittsburgh seam coal was fired for 5085 h and clean fuel gas was produced for 2746 h. Product gas higher heating values above 100 Btu/scf were observed during initial testing when gasifier thick wall refractory was intact. However, refractory thickness decreased, causing higher vessel heat absorption and hence lower gas temperatures. Lower than design gasification kinetics for Pittsburgh seam coal char and higher than design vessel heat absorption resulted in lower char gasification rates and decreased gas heating values. DOE

N83-30561# Mobil Research and Development Corp., Princeton, N. J. Central Research Div.
FUNDAMENTAL STUDIES IN THE CONVERSION OF COALS TO FUELS OF INCREASED HYDROGEN CONTENT: THE CHEMISTRY AND MECHANISM OF COAL CONVERSION TO CLEAN FUEL Final Report
F. J. Derbyshire, G. A. Odoerfer, and P. Varghese Mar. 1983 144 p refs Sponsored by EPRI
(EPRI Proj. 1655-1)
(DE83-902933; EPRI-AP-2912) Avail: NTIS HC A07/MF A01

The pertinent aspects of two stage coal conversion in which a thermal dissolution step is followed by reaction in the presence of a catalyst were examined. The effects of solvent quality, the reaction sequence and the reaction conditions in two stages on the overall conversion and product distribution from the liquefaction of a subbituminous coal were investigated. Single stage catalytic coal conversions provide a basis from which to evaluate the relative effectiveness of two stage conversion and to identify measures for its improvement. The mechanisms of coal dissolution in high boiling compounds identified, polycondensed aromatics, and certain basic nitrogen heterocycles as effective coal solvents. The conversion of a subbituminous coal in solvents containing 1,2,3,4,-tetrahydroguinoline and of the extent of coal solvent interactions in solvent chemistry are discussed. DOE

N83-30562# New York Univ., New York. Dept. of Applied Science.
EXPERIMENTAL STUDY OF THE EFFECT OF FUEL VAPORIZATION ON COMBUSTION EFFICIENCY
V. Zakkay, A. Agnone, and H. Clisset May 1982 32 p refs
(Contract DE-FG22-81PC-40288)
(DE82-016419; NYU/DAS-82-05) Avail: NTIS HC A03/MF A01

A residential-scale vaporizing burner concept for No. 2 oil was developed. The design and construction of a prototype free-standing unit, complete with a recuperative air heat exchanger, a blue-flame sensor, and automatic controls for extended steady-state and cyclical operation, are presented. The principal objective was to assess the effects of fuel vaporization on combustion efficiency and emission, and to assess its performance over extended operation on the order of a hundred hours. The vaporization scheme consists of spraying No. 2 oil onto a regeneratively heated surface at a temperature above the fuel-vaporization temperature (650 F). Operation near stoichiometric condition is demonstrated with zero soot formation, 15.1% carbon dioxide, 0.4% O2, and low CO levels (aproximately 200 ppM) at the stack. However, due to the high flame temperatures, the NO levels (approximately 400 ppM) of this single-stage burner are excessive. DOE

N83-30563# Brookhaven National Lab., Upton, N. Y.
KINETICS OF OXIDATION OF AQUEOUS SULFUR (4) BY NITROGEN DIOXIDE
Y. N. Lee and S. E. Schwartz 1982 15 p refs Presented at 4th Intern. Conf. on Precipitation Scavenging Dry Deposition and Resuspension, Santa Monica, Calif., 29 Nov. 1982
(Contract DE-AC02-76CH-00016)
(DE83-005909; BNL-32366; CONF-821136) Avail: NTIS HC A02/MF A02

The gas-liquid oxidation reaction of sulfur (4) by NO2 was studied at neutral pH's i.e., 6.40 and 5.80, and low reagent concentrations, i.e., S(4) approximately .000001 M and p (sub NO2) approximately 1 x 10 to the minus seventh power atm. Major products found under these reaction conditions are H(+), NO2(-), and SO4(=), and the stoichiometry is consistent with 2 NO2 + HSO3(-) + H2O > 3 H(+) + 2 NO2 (-) + SO4 (=). The reaction rate was determined by following acid production via a pH-stat apparatus as a function of mixing time constant of the gas and liquid phases (tau/sub m/ = 1.6 5.3 s). The reaction rate was found to be significantly controlled by mass-transfer, even at the low reagent concentrations employed, and the extrapolation to the phase-mixed condition (tau/sub m/ = O) was able to yield only a lower-limit reaction rate constant. This rate constant, for reaction rate interpreted according to an overall second-order rate expression (R = k/sup (2)/ [S(4)]), was 200000. 1/m 1/s pH 6.40 and 5.80. DOE

N83-30564# Pittsburgh Univ., Pa. Dept. of Civil Engineering.
ADVANTAGES/LIMITATIONS OF SOLVENT EXTRACTION, OZONATION, AND CARBON ADSORPTION FOR REDUCTION OF NONBIODEGRADABLE RESIDUALS IN METC FIXED-BED GASIFICATION WASTEWATERS Final Report
Ronald D. Neufeld, J. Paladino, C. Moretti, M. Plautz, and F. Ali 1 Dec. 1982 173 p refs
(Contract DE-AC21-81MC-16528)
(DE83-005594; DOE/MC-16528/1328) Avail: NTIS HC A08/MF A01

This (second) year of effort examined the roll of solvent extraction, ozonation, and carbon adsorption for incorporation into the wastewater treatment scheme for purposes of enhancing process stability, decolorization, elimination of dilution water requirements, and minimization of nonbiodegradable residuals. This

approach, while more costly, will better allow for direct discharge or reuse of gasification wastewaters. Di-isopropylether (DIPE) and methyl-isobutyl ketone (MIBK) were incorporated into a pretreatment step with free and fixed ammonia stripping followed by activated sludge treatment. Solvent extraction did not result in a decrease of nonbiodegradable residuals from the bioreactor, but did result in a highly stable operation of the bioreactors with no dilution water requirements and a minimal tendency for foaming and biodeflocculation. Ozonation of biofeed resulted in phenol being kinetically favored for oxidation. DOE

N83-30565# Babcock and Wilcox Co., Alliance, Ohio. Research and Development Div.
COMPUTATIONAL TOOLS FOR PULVERIZED-COAL COMBUSTION Quarterly Report, Jul. - Sep. 1982
W. J. Oberjohn, D. K. Cornelius, and W. A. Fiveland Jan. 1983 40 p refs
(Contract DE-AC22-81PC-40265)
(DE83-009312; DOE/PC-40265/6; ARC-5278; QR-6) Avail: NTIS HC A03/MF A01

The general objective is to develop and verify a computer code capable of modeling the major aspects of pulverized-coal combustion. The combustion model (COMO) consists of a number of relatively independent modules that represent the major processes involved in pulverized-coal combustion. The formulation and coding of the initial gas-phase turbulence, chemistry and radiation models have been completed. Test cases were run for the turbulence and radiation models, and good agreement was obtained with other analyses and with data, when available. COMO predictions for both swirling and nonswirling isothermal flow were compared to proprietary data and predictions and found to be in agreement. The discrete-ordinates radiation model was compared to both experimental data and other predictions, and very good agreement was achieved. Evaluation of the fast-kinetics micromixing model continued. DOE

N83-30566# West Virginia Univ., Morgantown. Dept. of Chemical Engineering.
PHASE BEHAVIOR OF APPALACHIAN CRUDES WITH CARBON DIOXIDE Final Report, 28 Sep. 1979 - 30 Sep. 1981
T. G. Monger Nov. 1982 83 p refs
(Contract DE-AM21-79MC-11284)
(DE83-002979; DOE/MC-11284/17) Avail: NTIS HC A05/MF A01

The phase behavior of thirty mixtures of Appalachian crude oil and carbon dioxide are described. Stock tank oils from the Hilly Upland field in northcentral West Virginia, and the Bath field in northcentral Ohio are examined in the presence of equimolar amounts of CO2. The effects of small amounts of contaminant gases are probed using methane, nitrogen, hydrogen sulfide and sulfur dioxide. Additional changes due to the presence of brine are studied. Data was collected in single contact phase equilibrium experiments using a high pressure windowed condensate PVT cell. The volumetric behavior of sample mixtures was monitored. Total sample and individual phase volumes were recorded up to pressures of 3600 psi, and at temperatures above and below the CO2 critical temperature. Saturation pressures and the extent of oil swelling were determined from the PVT measurements. Significant results show that the phase equilibria determined for CO2-Appalachian crude oil mixtures generally emulate that reported for Western crude oil systems. DOE

N83-30567# Massachusetts Inst. of Tech., Cambridge.
URANIUM FROM SEAWATER RESEARCH REPORT, FY 1982 Final Progress Report
J. Borzekowski, M. J. Driscoll, and F. R. Best Sep. 1982 50 p refs
(Contract DE-AM01-76EI-02295)
(DE83-002477; MIT-EL-82-037; MITNE-254) Avail: NTIS HC A03/MF A01

During the FY 1982 campaign 14 new ion exchange resin formulations, prepared by the Rohm and Haas Company, were tested by MIT at the Woods Hole Oceanographic Institution. The best of these chelating resins was again of the acrylic amidoxime type; it picked up approximately 100 ppM uranium in seven days exposure to seawater, which represents a factor of better than two improvement over the seven day results for the best FY 1981 candidate (which saturated at roughly 100 ppM U after 30 days of exposure). Saturation was not reached and, within experimental accuracy, uranium accumulated at a constant rate over the seven day period; it is speculated that a useful capacity of over 300 ppM U would be achieved. All resins of the styrenic amidoxime type were found to be an order of magnitude lower in their effective capacity for uranium in seawater than the best of the acrylic forms. DOE

N83-30568# Sandia Labs., Albuquerque, N. Mex.
HYDROGEN COMBUSTION IN AQUEOUS FOAMS
M. R. Baer, S. K. Griffiths, and J. E. Shepherd 1983 29 p refs Presented at the 2nd Intern. Topical Meeting on Nucl. Thermalhydraulics, Santa Barbara, Calif., 11 Jan. 1982
(Contract DE-AC04-76DP-00789)
(DE82-019736; SAND-82-0917C; CONF-830103-20) Avail: NTIS HC A03/MF A01

Water fogs are an effective countermeasure to large scale hydrogen combustion that might accompany loss of coolant. An alternate method of suspending the desired mass of water is via high expansion ratio aqueous foams. Because, in practice, the foam would be generated using the combustible gaseous contents of the containment vessel, combustion occurs inside the foam cells. To assess the usefulness of aqueous foams in a mitigation plan, several open tube tests and over one hundred closed vessel tests of hydrogen/air combustion with and without foam were conducted. At low and intermediate hydrogen concentrations, the foam has little effect on the ultimate isochloric pressure rise. Above 15% hydrogen concentration, the foam causes a significant reduction in the pressure rise. The maximum effect occurs at about 28% hydrogen (the stoichiometric limit is 29.6% hydrogen) where the peak overpressure is reduced by two and one half. DOE

N83-30569# Sandia Labs., Albuquerque, N. Mex.
INTERNAL STRUCTURE OF A PREMIXED TURBULENT FLAME
S. Rajan (Southern Illinois Univ., Carbondale), J. R. Smith, and G. D. Rambach Oct. 1982 29 p refs Presented at the Combustion Inst. Symp. on Western States Section, Livermore, Calif., 11-12 Oct. 1982
(Contract DE-AC04-76DP-00789)
(DE83-001948; SAND-82-8865; CONF-821035-7) Avail: NTIS HC A03/MF A01

A pulsed laser and a multielement detector have been used to make instantaneous Rayleigh profiles along a line through a turbulent flame front thus eliminating the effects of flame front motion. The flame front in a premixed turbulent flame moves randomly about a mean position, giving rise to the visually observed flame brush or time averaged flame thickness which is larger than the instantaneous thickness of the reaction zone. The physical characteristics and statistical properties of such turbulent flames reported previously were deduced from the time histories of Rayleigh scattered laser light at one or two points within the reaction zone. The study was conducted on a premixed propane air flame stabilized on a rod at the exit plane of a square burner. Turbulence producing screens below the burner exit controlled turbulent length scales while intensity was controlled with inlet mixture velocity. Turbulence properties of the cold reactants were determined by hot wire anemometry. DOE

N83-30570# Edgerton, Germeshausen and Grier, Inc., Goleta, Calif.
GAMMA-RAY SPECTROMETRY WITH THICK MERCURIC IODIDE DETECTORS
A. Beyerle, K. Hull, J. Markakis, B. Lopez, and W. M. Szymczyk (Inst. for Physics and Imaging Science, Marina Del Rey, Calif.) 1982 21 p refs
(Contract DE-AC08-76NV-01183)
(DE83-002426; DOE/NV-01183/214-TP) Avail: NTIS

HC A02/MF A01

Gamma-ray spectra with energies up to 1.3 MeV have been detected for the first time with 1-cm-thick HgI2 semiconductor detectors at room temperature. The spectra can be taken using a long, 10 microseconds, or a short, 0.5 microseconds charge collection time. The latter has produced better results with better peak efficiency, higher peak-to-valley ratio, and fewer low energy counts with little sacrifice in resolution. Spectra for energies between 100 keV and 1.3 MeV and descriptions of the techniques for their acquisition are presented. The thick detectors need a conditioning treatment, which is described, prior to showing spectral response. DOE

N83-30571# California Univ., Berkeley. Dept. of Physics.
INFRARED-EMISSION SPECTROSCOPY OF CO ON Ni
S. Chiang, R. G. Tobin, and P. L. Richards Sep. 1982 6 p refs Presented at the 3rd Intern. Conf. on Vibrations at Surfaces, Pacific Grove, Calif., 1 Sep. 1982
(Contract DE-AC03-76SF-00098)
(DE83-002328; LBL-14552; CONF-820977-2) Avail: NTIS HC A02/MF A01

The first observation of thermally emitted infrared radiation from vibrational modes of molecules adsorbed on clean, single-crystal metal surface is reported. The observation of emission from CO adsorbed on Ni demonstrates the surface sensitivity of a novel apparatus for infrared vibrational spectroscopy, with a resolution of 1 to 15/cm over the frequency range from 330 to 3000/cm. A liquid-helium-cooled grating spectrometer measures the thermal radiation from a room-temperature, single-crystal sample, which is mounted in an ultrahigh-vacuum system. Measurements of frequencies and linewidths of CO on a single-crystal Ni sample, as a function of coverage, are discussed. DOE

N83-30572# Sandia Labs., Albuquerque, N. Mex.
RAMAN SPECTROSCOPY FOR CHARACTERIZATION OF ANNEALING OF ION-IMPLANTED InP
D. R. Myers, P. L. Gourley, K. V. Vaidyanathan (Hughes Research Lab., Malibu, Calif.), and H. I. Dunlap (Hughes Research Lab., Malibu, Calif.) 1982 14 p refs Presented at the Intern. Symp. on GaAs and Related Compounds, Albuquerque, N. Mex.
(Contract DE-AC04-76DP-00789)
(DE82-022193; SAND-82-1401C; CONF-820960-5) Avail: NTIS HC A02/MF A01

Raman spectroscopy has been used as a noncontacting, nondestructive tool to evaluate the properties of Si(+) - and Be(+) - implanted InP samples annealed at temperatures ranging from 600 to 750 C using phosphosilicate glass (PSG) as the encapsulant. Carrier activation, carrier mobility and recovery of damage as a function of anneal temperature obtained from analysis of Raman data agree very well with independent electrical measurements. DOE

N83-30573# Karlsruhe Univ. (West Germany). Inst. fuer Chemische Technik.
INVESTIGATION OF THE INFLUENCE OF MINERAL MATTER OF COALS AND COKES ON THE KINETICS OF GASIFICATION WITH HYDROGEN AND WATER VAPOR Final Report, Jan. 1983
Klaus Juergen Huettinger and Werner Krauss Bonn Bundesministerium fuer Forschung und Technologie Mar. 1983 126 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-009; ISSN-0340-7608) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 26,50

Catalytic reaction kinetics were studied using coals of different rank, pretreated and doped coals and model carbons of similar preparation. Pure hydrogen, hydrogen/water vapor and inert gas/water vapor mixtures were used as gasifying agents. Pressure was varied between 0, 1 and 2 MPa and the temperature range extended from 790 to 1010 C. A decisive catalytic effect only results from iron. This effect may control gasification with hydrogen and water vapor above 850 C. Iron disulfide minerals have to be reduced to the catalytically active metal. In water vapor gasification, the gaseous atmosphere has to be adjusted so that the iron is stable in the reduced state. Sulfur of organic origin in coal lowers but does not prevent catalytic activity of iron. Alkaline metals can act as sulfur scavenger. Catalytic activity of iron in hydrogasification is recommended. Author (ESA)

N83-30574# Commission of the European Communities, Luxembourg.
MANUFACTURING METHOD FOR PHOTOVOLTAIC MATERIALS BY CHEMICAL SPRAY PULVERIZATION Final Report
M. Savelli (Universite des Sciences et Techniques de Languedoc, Montpellier, France), J. Lahaye (Universite du Haut-Rhin, Mulhouse, France), and J. Vedel (Ecole Nationale Superieure de Chimie, Paris) Feb. 1983 60 p refs Transl. into ENGLISH of the book "Methode de Fabrication de Materiaux Photo-Voltaiques par Pulverisation Chimique Spray" 1982 64 p
(PB83-166629; EUR-7015-FR) Avail: NTIS HC A04/MF A01 CSCL 07A

Acetonitrile was shown to be a suitable carrier solvent for the preparation of thin layers of cuprous sulphide by chemical atomization. A reactive spraying apparatus for monodispersed mist was developed. It is claimed to be indispensable for establishing a firm relation between the characteristics of the mist and those of the films obtained. The formation of thin layers of cadmium sulphide and stannic oxide on various supports was studied and the quality of the layers, their adhesion to the support, and the influence of the nature and temperature of the support on the reactions were investigated. Three laboratories have participated in the evaluation of the physical characteristics of the thin layers. Author

N83-30575# Delaware Univ., Newark. Water Resources Center.
PHOTOCATALYTIC OXIDATION OF ORGANIC POLLUTANTS
G. L. Schrader and M. M. Hwang Dec. 1982 30 p
(Contract DI-14-34-0001-9008)
(PB83-173179; W83-02126; OWRT-A-042-DEL(2)) Avail: NTIS HC A03/MF A01 CSCL 07D

The photooxidation of phenol in aqueous solution with several catalysts was studied in a batch-recycle reactor at 65 C and atmospheric pressure. The tubular reactor was irradiated with a polychromatic ultraviolet lamp located at a focus of a elliptical reflector. Different metal nitrate salts were used as catalysts, including nickel nitrate, cobalt nitrate, ferric nitrate, manganese nitrate, cerium nitrate and lanthanum nitrate. Liquid samples from the photoreactor were analyzed by gas chromatography for phenol concentration. The presence of cations of catalysts were determined by ultraviolet spectroscopy. The ferris nitrate was the most active catalyst. The initial rate of phenol decomposition was in first order with respect to phenol concentration for all catalysts. GRA

N83-30576# SRI International Corp., Menlo Park, Calif. Chemistry Lab.
NOVEL POLYMERS FOR REVERSE OSMOSIS MEMBRANES Final Technical Report
J. F. Wolfe, R. S. Jones, and P. D. Sybert 18 Nov. 1982 56 p
(Contract DI-14-34-0001-0465)
(PB83-173237; W83-02132; OWRT-C-00139-S(0465)(1)) Avail: NTIS HC A04/MF A01 CSCL 07D

A family of tertiary polyamide prepolymers was sought in an effort to develop new chlorine-resistant reverse osmosis (RO) membranes and to determine the relationship of the molecular structure and morphology of the membrane with its RO performance. GRA

N83-30577# West Virginia Univ., Morgantown. Water Research Inst.
UTILIZATION OF MOLECULAR OXYGEN AND SUNLIGHT IN THE OXIDATIVE PURIFICATION OF WATER
William R. Cherry and Brian P. Jessen 1982 22 p refs
(Contract EPA-14-34-0001-1152)

(PB-83173252; W83-02134; OWRT-A-042-WVA(1)) Avail: NTIS HC A02/MF A01 CSCL 07D

The study was directed toward obtaining knowledge that could be used in developing new, better, and less costly methods for treating wastewater and drinking water without producing harmful substances. Oxidation of several chlorinated phenols by singlet oxygen was investigated. The two main products resulting from the oxidation of orthochlorophenol were isolated and characterized. The rates are practical for treatment even at the low concentrations of chlorinated phenols commonly contained in polluted water-supply sources. The rate for pentachlorophenol is faster than those for the monochlorophenols. Pentachlorophenol was completely decomposed in three hours. The process is satisfactory as a basis for research and development of a new wastewater and water-supply treatment method. Author (GRA)

N83-30578# Colorado Univ., Boulder. Dept. of Engineering.
PHASE EQUILIBRIA: AN INFORMAL SYMPOSIUM
B. E. Eaton, J. F. Ely, H. J. M. Hanley, R. D. McCarty, and J. C. Rainwater Jan. 1983 157 p refs Prepared in cooperation with Polish Academy of Sciences, Warsaw Sponsored by NBS
(PB83-174045; NBS-TN-1061) Avail: NTIS HC A08/MF A01 CSCL 07D

Extended corresponding states, critical behavior, mixing rules, and, in general, the prediction of the phase behavior of simple mixtures were discussed. A survey of methods used in industry was also presented. GRA

N83-30579# Bureau of Mines, Albany, Oreg. Albany Research Center.
THERMODYNAMIC PROPERTIES OF ELEMENTS AND OXIDES
L. B. Pankratz and R. V. Mrazek Jan. 1983 515 p refs
(PB83-174052; BU-B-672; LC-82-600178) Avail: NTIS HC A22/MF A01 CSCL 07D

Thermodynamic data on the elements and oxides were reviewed, evaluated, and compiled. Examples of calculations using these data are given. A short statement of some fundamental ideas of thermodynamics and several examples of their use are included. The examples illustrate several alternate methods of calculation using both the tabulated values and the equations. Comparisons are also made on the basis of ease of calculation and accuracy of results. GRA

N83-30580# Research Triangle Inst., Research Triangle Park, N.C.
PERMSELECTIVE MEMBRANES FROM POLYIMIDES AND AROMATIC POLYAMIDES Final Report, 1 Aug. 1980 - 30 Sep. 1982
Anton Schindler Sep. 1982 235 p
(Contract DI-14-0001-0464)
(PB83-178046; RTI/2063-00-01F; W83-02222;
OWRT-C-00131-S(0464)(1)) Avail: NTIS HC A11/MF A01 CSCL 07D

Reverse osmosis membranes possessing asymmetric morphology were fabricated from polyimides and polyamides of various chemical structures. These asymmetric membranes were characterized as to their morphology, chemical stability, thermal stability and hyperfiltration properties. Overall, the reverse omosis properties of the polyimide membranes indicated that as a class of polymers they are not very good candidates for desalination membranes. The aromatic polyamide structure-hyperfiltration property relationship was studied. Methods for the preparation of molecular weight N-substituted aromatic polyamides were evaluated. The polymer N,N-piperzine-bis(4hydroxybenzamide) exhibited excellent thermal stability and chlorine stability. GRA

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N83-30581# Central Electricity Generating Board, London (England).
THE CHARACTERISTIC STRUCTURE OF WELD METAL OF HIGH TEMPERATURE ALLOY X2OCrMoV121
K. Kussmaul, D. Blind, P. Deimel, and W. Gaudig 1981 17 p refs Transl. into ENGLISH from Arch. Eisenhuettenwes (West Germany), v. 52, no. 11, 1981 p 445-450
(BLL-CE-Trans-7937-(9022.09)) Avail: British Library Lending Div., Boston Spa, Engl.

Metallographic investigations were carried out on test welds. The effect was examined of a second tempering treatment and of a long term annealing treatment (at 550 C) on weld metal structure identical with the metal X2OCrMoV 121. Author

N83-30582# Central Electricity Generating Board, London (England).
THICKNESS EFFECT IN THE BRITTLE FRACTURE OF EXTRA-HEAVY GAUGE STEEL
K. Ikeda and K. Senda 1983 22 p refs Transl. into ENGLISH from R and D Kobe Seiko Giho (Japan), v. 22, no. 2, 1972 p 101-107
(BLL-CE-Trans-7941-(9022.09)) Avail: British Library Lending Div., Boston Spa, Engl.

The brittle fracture initiation and arrest characteristics of SM41 killed steel from the same charge when rolled to thicknesses of 200, 150, 100 and 50 mm (including plates for which thickness was reduced from 150 mm to 100 mm by machine cutting) are examined. Author

N83-30583 United Kingdom Atomic Energy Authority, Risley (England).
PARAMETERS OF STRAINING-INDUCED CORROSION CRACKING IN LOW-ALLOY STEELS IN HIGH TEMPERATURE WATER
E. Lenz, A. Liebert, B. Stellwag, and N. Wieling 1983 10 p refs Transl. into ENGLISH of conf. paper from the 8th MPA Seminar, 1982 Seminar held in Erlangen, West Germany, 1982
(BLL-Risley-Tr-4740-(9091.9F)) Copyright. Avail: Issuing Activity

The parameters causing corrosion cracking at low strain rates of low alloy steels in high temperature water were determined by tensile tests with slow deformation speeds. In addition to the strain rate, the temperature and oxygen content are shown to be important for the deformation procedure of the steels tested (17MnMoV64, 20MnMoNi55 and 15NiCuMoNb 5). Temperatures around 240 C, increased oxygen content in the water and low strain rates produces a reduction in the ductility of the material in relation to its behavior in air. Corrosion fatigue tests show that the parameters which are important for straining induced corrosion cracking with low strain speeds are also significant when low frequency cyclic loads are used with high strain amplitude. Straining induced corrosion cracking is counteracted through the avoidance of non-elastic straining, as well as the definition and supervision of water chemistry. A.R.H.

N83-30584# Electricity Council, London (England).
AN ELECTROLYSER FOR ELECTROCHEMICAL TREATMENT OF ETCHING SOLUTIONS CONTAINING GOLD
A. P. Amaryan, V. M. Bazilevskii, L. I. Gratsershtein, V. A. Bykov, and K. I. Kryshchenko 1983 7 p refs Transl. into ENGLISH of Russian Patent no. 2340809/26 (17 Dec. 1975)
(BLL-OA-Trans-1864-(6196.3)) Avail: British Library Lending Div., Boston Spa, Engl.

An electrolyzer for treating etching solutions containing gold and halides comprises a thermostatically controlled body in which an anode and a cathode are separated by a ceramic diaphragm. The sizes of the probes in the ceramic diaphragm are equal to 0.0001 to 0.001 mm, and the electrodes are made of Sitallografit with a reaction of the areas 1:10 to 1:20. Gold can be simultaneously extracted while the etching solution is regenerated. A.R.H.

N83-30585# Electricity Council, London (England).
CONCERNING THE CATHODIC PROCESS OF ELECTRODEPOSITION OF IRON

B. V. Namakonov and M. P. Melkov 1983 7 p refs Transl. into ENGLISH from Elektrokhim. (USSR), v. 14, no. 4, 1978 p 585-587
(BLL-OA-Trans-1894-(9091.9F)) Avail: British Library Lending Div., Boston Spa, Engl.

The cathodic process of electrodeposition of iron was investigated. Author

N83-30586# Electricity Council, London (England).
INTERNAL STRESSES IN ELECTROLYTIC DEPOSITS OF METALS
V. S. Ioffe Apr. 1983 30 p refs Transl. into ENGLISH from Uspekhi Khim. (USSR), v. 13, no. 1, 1944 p 48-63
(BLL-OA-Trans-1899-(6196.300)) Avail: British Library Lending Div., Boston Spa, Engl.

In the electrolytic deposition of chromium, nickel, iron and certain other metals, spontaneous cracking of the deposit and peeling away from the substrate is observed. In the deposition of zinc, cadmium, lead and tin such peeling of the deposit from the substrate is often a consequence of swelling of the deposit and formation of bubbles in it. The causes of both phenomena have so far remained insufficiently clear. They are usually attributed to poor preparation of the surface or to the presence of inclusions in it, impairing its adhesion to the deposit. Both cracking of the deposit and swelling of the deposit are primarily due to the development of internal stresses in the deposit. The fact that deposits of some metals are liable to cracking, whereas swelling of the deposits is observed for other metals, indicates that there is no specific character of the internal stresses developing in deposits of various metals. Internal stresses in electrolytic deposits is examined and a survey of existing theories presented. Author

N83-30587# Central Electricity Generating Board, London (England).
EFFECT OF SPECIMEN SIZE AND LOADING CONDITION ON BRITTLE FRACTURE ARREST CHARACTERISTICS
Takeshi Kanazawa, Susumu Machida, Hiroshi Yazima, and Mitsuru Aoki 1983 18 p refs Transl. into ENGLISH from Nippon Zosen Gakkai Rombunshu (Japan), no. 130, 1971 p 343-351
(BLL-CE-Trans-7940-(9022.09)) Avail: British Library Lending Div., Boston Spa, Engl.

The effect of limitation on specimen breadth and length and the effect of loading condition arising from the fact that specimen size is finite is examined. Author

N83-30588# Central Electricity Generating Board, London (England).
NEW NONMAGNETIC HIGH MANGANESE STEELS
S. Sawa 1983 28 p refs Transl. into ENGLISH from Nippon Kinzoku Gakkai Kaiho (Japan), v. 18, no. 8, 1979 p 573-581
(BLL-CE-Trans-7891-(9022.09)) Avail: British Library Lending Div., Boston Spa, Engl.

Derived by partial substitution of nickel by Mn and C in the Cr-Ni system, Cr-Ni Mn alloys were developed as construction materials. Almost all the recently developed nonmagnetic high manganese steels are Fe-Mn-C alloys with small amounts of Cr, Ni, and V added to suit particular applications. The physical properties of 15 Mn and 18 Mn nonmagnetic steels are compared with those of carbon steel and 18Cr-18Ni stainless steel SUS304. The thermal expansion coefficient, permeability, and effects of cold working on nonmagnetic manganese steels are discussed as well as their mechanical effects, machinability, and weldability. The low thermal expansion coefficients of 24 Mn-6 Cr steel, 24 Mn-1.5 Cr steel and 25 Mn-5Cr-1Ni steel are also examined. A.R.H.

N83-30589# Central Electricity Generating Board, London (England).
EFFECT OF THE STRUCTURAL STATE ON THE CREEP BEHAVIOR OF 13 Cr Mo 4 4 TYPE STEEL
H. Fabritius 1983 24 p refs Transl. into ENGLISH from VGB Kraftwerkstech. (West Germany), v. 61, no. 10, 1981 p 873-882
(BLL-CE-Trans-7905-(9022.09)) Avail: British Library Lending Div., Boston Spa, Engl.

The behavior under creep conditions of a particle type of steel is dependent on its grain structure and chemical composition - both as regards long-term strength properties and toughness. A knowledge of the dispersion of these characteristics attributable to differences in grain structure is important to permit the effects of the machinery and heat treatment parameters which cause the grain structure to change to be assessed. Creep tests were conducted on a melt comprising 13 Cr Mo 4 4 steel in several different heat treatment states. The initial reference condition is produced by a works heat treatment in accordance with the specifications. The effect of cold working with and without subsequent annealing, and also the condition of the metal after oil-quenching and tempering are examined. Decarburized test pieces were also examined to study the properties of the basic ferritic masses. A.R.H.

N83-30590# Electricity Council, London (England).
INTERNAL STRESSES IN CATHODIC NICKEL DEPOSITS
A. L. Rotinyan and E. S. Kozich 28 Apr. 1983 10 p refs Transl. into ENGLISH from Zh. Prikl. Khim. (USSR), v. 31, no. 3, 1958 p 424-428
(BLL-OA-Trans-1900-(6196.300)) Avail: British Library Lending Div., Boston Spa, Engl.

The contractormeter method was used to study the influence of the components of a chemical bath, of current density, and of temperature on the internal stresses in cathode deposits of nickel. Results show that internal stresses in the deposits increase linearity with increased sodium chloride concentration in the electrolyte. Variation of the concentration of sodium sulphate and boric acid in the range investigated had no influence on internal stresses. It is confirmed that the criterial pH value corresponds to the start of colloidal particle development. Internal stresses are practically independent of the current density if the pH of the electrolyte is kept constant. If, with temperature rise, hydrolysis increases to the extent that colloidal formations appear in the electrolyte, internal stresses increase in the deposits. Otherwise, there is a slight decrease of internal stresses with temperature rise. A.R.H.

N83-30591# Electricity Council, London (England).
INTERNAL STRESSES IN ELECTROLYTIC DEPOSITS OF NICKEL
A. G. Samartsev and Yu. V. Lyzlov 3 May 1983 13 p refs Transl. into ENGLISH from Zh. Fiz. Khim. (USSR), v. 29, no. 2, 1955 p 374-379
(BLL-OA-Trans-1901-(6196.3)) Avail: British Library Lending Div., Boston Spa, Engl.

Internal stresses were measured in electrolytic deposits of nickel obtained from an ordinary bath and from a bath with additions of sulphonated naphthalene. All the deposits obtained from the bath without additives have roughly identical compressive stresses in the usual ranges of current density and electrolyte pH. The stresses increase sharply when pH increases to 6.1 to 6.3. Addition of sulphonated naphthalene to the bath leads to a decrease of internal stresses, and at sufficient concentration of additive there is even sign reversal (contraction of the metal is replaced by expansion). The dependence of the stresses on current density and the conditions of stirring of the electrolyte indicates rapid consumption of the additive at the cathode surface. The data obtained indicate that there are at least two reasons for the development of internal stresses in nickel deposits. One factor is the volume change of the substances forming the interlayers between the grains of the metal. Processes of this kind account for the high compressive stresses in deposits from a bath with pH $>$ 6 and expansion stresses in deposits from baths containing sulphonated naphthalene. Author

N83-30592# Electricity Council, London (England).
CONCERNING INVESTIGATION OF THE ELECTRODEPOSITION OF NICKEL. 2: ON THE NATURE OF MAXIMUM CURRENT DENSITY IN RESPECT OF NICKEL ON A ROTATING CATHODE
V. I. Ukeliene, O. Galdikiene, and J. Matulis 3 May 1983 10 p

refs Transl. into ENGLISH from Tr. Akad. Nauk Litovsk. SSR, Ser. B (USSR), v. 3, no. 58, 1969 p 89-94
(BLL-OA-Trans-1930-(6196.3)) Avail: British Library Lending Div., Boston Spa, Engl.

Basic experimental data for determining the sequence of the primary processes of discharge of H(+) and Ni(-), starting from the moment when the electric current is switched on is described. Results obtained with a rotating electrode, for determination of the magnitude and nature of the maximum current density in respect of Ni are also discussed. A potentiostatic method of determining cathodic polarization and a rotating cathode was employed. The cathode potentials were measured relative to a 0.1 N hydrogen electrode and are given as uncorrected values. S.L.

N83-30593# Electricity Council, London (England).
ON THE MECHANISM OF TITANIUM ELECTROPLATING FROM A NONAQUEOUS ELECTROLYTE
I. K. Yakovleva, Sh. Z. Khamudkanova, and E. A. Gurevich 3 May 1983 9 p refs Transl. into ENGLISH from the book "Khim. soedin. Redk. Tsvetn. Met." USSR, 1977 p 47-51
(BLL-OA-Trans-1981-(6196.3)) Avail: British Library Lending Div., Boston Spa, Engl.

The effect of the Ti concentration in the electrolyte, temperature, current density, and the nature of the complex former on the cathodic polarization of metals (titanium and cobalt) in a nonaqueous glycerine electrolyte was examined. To obtain polarization curves of deposition, a v-shaped electrolytic cell was used. Cathodic and anodic spaces were separated by a partition made of porous glass. These electrodes were in the form of sheets with a surface of 4 sq cm. An increase in the Ti concentration of the electrolyte from 7.66 to 20.0 g/1 is accompanied by a reduction in the cathodic polarization of the titanium and cobalt electrodes. Thus, in the electrodeposition of titanium, slight chemical polarization changes to concentrational polarization with increase in the potential. B.G.

N83-30594# British Library Lending Div., Boston Spa (England).
LAWS FOR THE OXYGEN REFINING OF COMPLEX NICKEL-BASE COMPOSITION METALLIC BATHS
M. S. Chekalkin, S. N. Paderin, L. R. Tager, and M. M. Klyuev [1982] 12 p refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved. Chern. Met. (USSR), no. 7, 1982 p 31-36
(BLL-M35020-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

A series of experimental heats, in which complex alloyed molten nickel-base alloys were oxygen refined, was carried out in a 5 t arc furnace. When the charge materials, made up of lump waste, chips and power grinding waste in dust form, had been melted, the bath was oxygen lanced with 1.8 cm diameter lined tubes. Metal samples were taken after short periods. The temperature of the metal was measured periodically with a tungsten-rhenium immersion thermocouple. The concentrations of elements altered during oxygen blowing of the bath in a typical experimental heat. The experimental data made it possible to calculate the rates at which elements were oxidized and to plot the relationships of the rates of combined oxidation of elements in the bath to the process time and the aluminum content of the molten alloy. Author

N83-30595# British Library Lending Div., Boston Spa (England).
INOCULATION OF GRAY CAST-IRON WITH HIGH CARBON EQUIVALENT
A. A. Zhukhov, S. V. Davydov, and G. N. Beizer 14 Jun. 1983 4 p Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved. Chern. Metall. (USSR), no. 7, 1982 p 157
(BLL-M-35038-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

Cast iron with a high carbon equivalent, which responds badly to inoculation, is successfully inoculated with a combination of chilling additions plus a graphitizing addition. Here, the additions, rather than neutralizing each other, produce a complimentary effect in the form of higher mechanical properties and lower tendency to chilling. Such an unusual effect is explained by the fact the surfactant elements Bi and Te, which generally prevent the growth of graphite phase nuclei, start to act in the opposite manner in the presence of a large number of nuclei, which appear on introduction of the ferrosilicon into the liquid, i.e., prevent solution of these graphite crystallization centers owing to chemisorption on their surfaces. Author

N83-30596# British Library Lending Div., Boston Spa (England).
CONDENSATION AEROSOLS IN PRODUCTION OF LOW-CARBON FERROCHROME AND MASTER ALLOYS
O. S. Bobkova and S. P. Topilskii 1983 8 p refs Transl. into ENGLISH from Stal. (USSR), no. 7, 1982 p 39-40
(BLL-M-35004-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

A study was made of samples taken during the mixing of an ore-lime melt with silicochrome to determine the quantity and composition of aerosols forming during the production of low-carbon ferrochrome and to assess the conditions of formation of high-valency chromium oxides. Sublimates recovered by means of hoods during charging of silicochrome and holding, during transfer of melts from ladle to ladle, during draw-off of slag, and during melts of metal were subjected to chemical, micro-X-ray spectral, petrographic, and X-ray crystallographic analyses. Aerosols forming during the production of chromium-manganese master alloys with 50 and 30% Mn were also investigated. Author

N83-30597# British Library Lending Div., Boston Spa (England).
INFLUENCE OF TEMPERATURE ON HARDNESSES OF TITANIUM CARBIDE AND VANADIUM CARBIDE COATINGS
V. G. Permakov, A. T. Serditov, and A. V. Byakova 1982 4 p refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved. Chern. Met. (USSR), no. 6, 1982 p 154
(BLL-M-34996-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The influence of temperature on the microhardness of TiC, V2C, VC and (Ti,Vi)C coatings on V8 steel was described. The surface microhardness of the coatings between 300 and 1300 K were measured. Analysis of the resultant data indicates that the coatings are placed in the following sequence in order of decreasing room-temperature hardness: TiC, (TiV)C, V2C and VC. A rapid decrease in microhardness with increase in temperature is detected. Author

N83-30598# British Library Lending Div., Boston Spa (England).
EFFECT OF AIR-COOLING ON PROPERTIES OF LOW-CARBON STEEL WIRE
S. I. Shapovalov and V. I. Alimov 24 May 1983 3 p Transl. into ENGLISH from Izv., no. 6, 1982 p 155T
(BLL-M-34997-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

It is demonstrated that air-sorbitizing the wire rod for manganese steel rope wire under thermostatic control is more economical than patenting the wire rods due to a change in the technology used for heat treating the wire rods and owing to the longer service life of the resultant ropes. R.J.F.

N83-30599# British Library Lending Div., Boston Spa (England).
REDISTRIBUTION OF GRAPHITE DURING THERMAL CYCLING OF GREY IRON
V. Yu. Slyusarev, V. A. Baranova, and I. S. Alekseichuk 1982 4 p refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved. Chern. Met. (USSR), no. 7, 1982 p 132-133
(BLL-M-35027-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

Structural changes in specimens taken from centricast grey iron pipes with the composition 3.7% C, 2% Si, 1% Mn, 0.1% S and 0.25% P were studied. Graphite was observed to move from the center of eutectic colonies with growth of inclusions at the colony boundaries. Graphite redistribution was found to result from segregation of silicon and manganese and from differences in the sizes of inclusions within the colonies and on their boundaries. Author

N83-30600# British Library Lending Div., Boston Spa (England).
FORMATION OF CARBIDE NETWORK IN ShKh15 AND KhVG STEELS
A. E. Pavaras 14 Jun. 1983 7 p refs Transl. into ENGLISH from Izv. Byssh. Ucheb. Zaved. Chern. Met. (USSR), no. 7, 1982 p 130-131
(BLL-M35026-(5828.4)) Avail: British Lending Library Div. Boston Spa, Engl.

The influence of austenitizing temperature on carbide network formation kinetics in ShKh15 and KhVG steel was examined. The presence of tungsten in KhVG steel reduces its susceptibility to carbide network formation compared to that of ShKh15 steel with chromium. ShKh15 shows maximum susceptibility to formation of carbide network after heating to 1100 C. Author

N83-30601# British Library Lending Div., Boston Spa (England).
CASTABILITY OF HIGH-CARBON ALLOYS OF IRON
S. V. Dorozhko, V. M. Korolev, and I. V. Dorozhko 14 Jun. 1983 6 p refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved. Chern. Met. (USSR), no. 7, 1982 p 150-151
(BLL-M35030-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

A brief account is given of a study of the castability of high-carbon alloys of iron. The results of measuring the castability of a pure synthetic Fe-C-S alloy are given. It was found that the influence of holding on the displacement of the castability maximum is evidently connected with change in the degree of micro-heterogeneity of the alloy, governed by the pressure of a large number of particles of high-melting-point phase graphite at the outset. R.J.F.

N83-30602# British Library Lending Div., Boston Spa (England).
AN INDEX TO THE STABILITY OF IRON
G. I. Silman and A. A. Zhukov 17 May 1983 8 p refs Transl. into ENGLISH from Iz. 121-124
(BLL-M34940-(5828.4)) Avail.: British Library Lending Div., Boston Spa, Engl.

The coefficients of effect beta sub i and the type epsilon sub i (Cr) equivalents are, with regard to concentration and temperature, dependent quantities. As the amount of a component is increased, the intensity of its effect decreases steadily. As a result, the parameters of cementite stability pi sub st. have a complex and nonlinear relationship to concentration, since the chemical composition of iron affects both the multiples in the terms in the corresponding equations. Author

N83-30603# British Library Lending Div., Boston Spa (England).
INTERACTION OF IMPURITIES IN METALLIC SOLID SOLUTIONS WITH ACCOUNT TAKEN OF THE LONG-RANGE EFFECT
Yu. S. Stark, A. Sh. Chavchanidze, and V. V. Borodai 17 May 1983 7 p refs Transl. into ENGLISH from Iz. 74-77
(BLL-M34935-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The influence of electron-density oscillations produced by the introduction of impurity atoms into a metallic solid solution on the energy of interaction of impurity atoms in pairs was studied. An expression was found for this interaction, and analytical expressions were obtained for the effective charges and the additional terms. These charges and terms were calculated for impurities in solutions based on copper and aluminum. R.J.F.

N83-30604# British Library Lending Div., Boston Spa (England).
THE FORMATION OF A DEFECT OF THE CORONA TYPE
G. I. Doronin, L. N. Belyanchikov, M. D. Zharnitskii, and V. A. Guzenkov 17 May 1983 7 p refs Transl. into ENGLISH from Izv., no. 5, 1982 p 32-25
(BLL-M34931-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The corona defect that arises from the formation of large accumulations of non-metallic inclusions in the structure of vacuum arc remelting ingots is discussed. This was associated with pieces of ingot crown getting into the metal pool, but trials did not confirm this theory and further research was carried out. The possibility of the action of a mechanism causing the falling of pieces of the ingot glazed coating into the metal pool leading to the corona defect was confirmed. Films of complex composition consisting of non-metallic inclusions were also found to be entrained into the pool and become fixed at the boundary of the twin phase region. R.J.F.

N83-30605# British Library Lending Div., Boston Spa (England).
OBSERVATION OF HETEROGENEITIES IN AMORPHOUS Fe-84B16 ALLOY BY THE METHOD OF LOW-ANGLE X-RAY SCATTERING
Yu. A. Skakov, N. V. Edneral, G. V. Martinson, and V. V. Savin 17 May 1983 7 p refs Transl. into ENGLISH from Izv. (USSR) p 81-83
(BLL-M-34937-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

Structural changes in amorphous Fe84B16 alloy on heating below the crystallization temperature are discussed. It was found that the general pattern of low-angle scattering of X-rays has the same character in the amorphous, partially crystallized and completely crystallized alloy, and corresponds to scattering by monodisperse heterogeneities with a radius of inertia of 3.0-4.0 nm. It is presumed that the heterogeneities in electron-density distribution consist of regions of reduced atomic-structure density (micro-pores in the limiting case) formed during crystallization because of differences in specific volumes of the alloy in the amorphous and crystalline state. Evidence was obtained of the high degree of perfection of primary alpha-phase crystals. Author

N83-30606# British Library Lending Div., Boston Spa (England).
FEATURES OF PROCESS OF DECOMPOSITION OF SOLID SOLUTION BASED ON SmCo5 COMPOUND IN SINTERED ALLOYS
A. S. Lileev and V. P. Menushenkov 14 Jun. 1983 9 p refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved. Chern. Metall. (USSR), no. 7, 1982 p 107-113
(BLL-M-35024-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The structural features of decomposition of a SmCo5 base solid solution in sintered alloys for permanent magnets of different composition were investigated. Specimens from different alloys were quenched from 1150 C and tempered at 700 to 1100 C and underwent X-ray crystallography analysis in Fe and Cr radiations. The nature of the observed decomposition depends on the composition of the alloys and the temperating temperature. The conditions for single phase and double phase decomposition of the solid solution are given. Author

N83-30607# British Library Lending Div., Boston Spa (England).
DEVELOPMENT OF EQUIPMENT FOR HEAT-TREATING ELECTROWELDED PIPES
V. M. Markevich, A. A. Zgura, V. E. Baburov, and A. S. Kadinova 1982 7 p refs Transl. into ENGLISH from St. (USSR), no. 5, 1982 p 92-93
(BLL-M-34926-(5825.4)) Avail: British Library Lending Div., Boston Spa, Engl.

A comprehensive survey of advances in the equipment used for hardening and tempering the weld joints and parent material of straight seam and spiral seam pipes in the USSR with particular emphasis on induction heating. The conclusions are that a heat treatment plant of straight seam pipes (more susceptible to bending during heating) must be equipped with means of straightening after heat treatment. The conveyors downstream of the furnaces must be of skewed roller design for straightening the pipes by rotation after tempering and normalizing. Author

N83-30608# British Library Lending Div., Boston Spa (England).
KINETICS OF THE MELTING OF SOLID SILICATE PARTICLES IN A LIQUID MELT
S. Yu. Goberis, V. F. Demchenko, and V. M. Abdulakh 17 May 1983 9 p refs Transl. into ENGLISH from Iz. p 133-137
(BLL-M34943-(5828.4)) Avail: British Library Lending Div., Boston

Spa, Engl.

The melting of solid silicate particles in a melt is considered and a mathematical model of the process for a melt of limited volume and with allowance for convective heat transfer is derived. Investigations on the model showed that the average melting rate of particles is dependent in an external way on their proportion by mass. For melting plants of the continuous type the rate controlling factor was the relaxation time of the melt temperature to the initial state. The intensification of the operation of such plants therefore depends mainly on measures aimed at reducing the period for restoring the set temperature by energy input to the melt. The effects considered are relevant to the preparation of melts, e.g., from blast furnace slags, for the mineral wool industry. Author

N83-30609# British Library Lending Div., Boston Spa (England).
DEDUCTION OF DATA DURING COMPUTER MODELLING OF PROCESSES OF METAL PRESSURE WORKING
S. A. Stebunov, A. Ya. Gun, and M. E. Gromov 17 May 1983 4 p refs Transl. into ENGLISH from Izv. Vyssh. Ucheb, Zaved. Chern. Met. (USSR), no. 5, 1982 p 147-148
(BLL-M34949-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

A program of graphic deduction was developed for the graphic representation of data, obtained by mathematical modelling of processes of metal pressure working by the method of conformal transformations, in the form of fields of isometric lines in the physical plane. Author

N83-30610# British Library Lending Div., Boston Spa (England).
X-RAY CRYSTALLOGRAPHIC INVESTIGATION OF REACTIONS MECHANISM IN THE V-2O-5-C AND MoO-3-C SYSTEMS
E. Yu. Zamalin, G. Ya. Meshcheryakov, and S. B. Sheboldaev 14 Jun. 1983 11 p refs Transl. into ENGLISH from Izv. Vyssh. Ucheb, Zaved. Chern. Met. (USSR), no. 7, 1982 p 3-7
(BLL-M35017-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

A theoreteical and experimental investigation of the carbon reduction of vanadium and molybdenum oxides, with X-ray crystallographic examination of the intermediate reduction products to elucidate the reaction mechanisms, is reported. The experimental data agree well with the results of thermodynamic calculations carried out with allowance for secondary reactions between oxides having different degree of oxidation. Author

N83-30611# British Library Lending Div., Boston Spa (England).
POTENTIOMETRIC INVESTIGATION OF THE Co-Ni SYSTEM
L. Ya. Kozlov, V. I. Lysyakova, V. P. Gladyshev, and N. N. Petrov 14 Jun. 1983 6 p refs Transl. into ENGLISH from Izv. Vyssh. Ucheb, Zaved. Chern. Met. (USSR), no. 7, 1982 p 8-9
(BLL-M35018-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

Cast alloys of the Co-Ni system were studied with the aid of the potentiometric method at 20C. The thermodynamic properties of the system were established and the existence of a CoNi3 superstructure in the solid alloys was confirmed. Author

N83-30612# British Library Lending Div., Boston Spa (England).
INTERNAL FRICTION OF NIOBIUM-TUNGSTEN-NITROGEN ALLOYS
A. V. Novikov, Yu. A. Pavlov, and V. E. Bakhrushin 1982 6 p refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved. Chern. Met. (USSR), no. 7, 1982 p 113-116
(BLL-M-35025-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The temperature dependence of the internal friction of the alloys Nb-N, Nb-2%(atom.) W-N, Nb-6%(atom.) W-N and Nb-12% (atom.) W-N was investigated with the use of the method of forced-vibrations of cantilever specimens. Two peaks, at 645 and 685 K, with activation energies of 143 and 153 kJ/mol, respectively, were found for Nb-N alloys. For the Nb-W-N alloy three peaks were found at 645, 685, and 745 K, with activation energies of 143, 153 and 167 kJ/mol, respectively. The appearance of the 645 K peak is attributed to relaxation of single nitrogen atoms occupying tetrahedral interstices, and that of the 685 K peak to those occupying octahedral interstices. The appearance of the 745 K peak is attributed to relaxation of single nitrogen atoms, one of whose nearest neighbors is a tungsten atom. Author

N83-30613# British Library Lending Div., Boston Spa (England).
TRANSACTIONS OF THE 7TH INTERNATIONAL CONGRESS ON CORROSION OF METALS
V. N. Zikeev 17 May 1983 8 p Transl. into ENGLISH from Stal (Moscow), no. 5, 1982 p 76-78 Congr. held in Mainz, West Germany, 6-11 Sep. 1981
(BLL-M26976-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The latest major advances in metallurgical materials resistant to corrosion in general, stress-corrosion cracking, hydrogen embrittlement, etc., and methods of testing and passivation were reviewed. The results of the latest research and thinking on this subject are also presented. Author

N83-30614# British Library Lending Div., Boston Spa (England).
PROPERTIES OF STEELS 10, 20 AND ShXh15 DURING DEFORMATION IN RANGE OF PHASE TRANSFORMATIONS
Yu. V. Samaryanov, Yu. A. Borisov, V. A. Zubareva, G. S. Mingalova, and T. Yu. Gritsenko 1982 4 p refs Transl. into ENGLISH from Stal (USSR), no. 5, 1982 p 80-81
(BLL-M-26997-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

Plastometer tests were conducted on cylindrical specimens of steels 10, 20, and ShKh15 in a study of the change in the ductility and resistance to deformation of the steels as a function of the temperature and rate of deformation. The optimum temperatures of deformation of the given steels at which maximum ductility and minimum resistance to deformation are observed were determined. Author

N83-30615 National Physical Lab., Teddington (England). Div. of Materials Applications.
OXYGEN STEELMAKING PROCESSES
B. J. Keene Mar. 1983 21 p
(NPL-DMA(A)-61; ISSN-0143-7313) Copyright. Avail: Issuing Activity

The principles and operation of current oxygen steel making procedures are outlined including the Lind-Donavitz process (or BOF process), the LDAC or oxygen line powder process, the KALDO process, the IRSID continuous steelmaking; the OBM or quiet basic oxygen process, the LWS process, the AOD (argon oxygen decarburization) process, the Creusot-Loire-Voldeholm process and the VOD (vacuum oxygen decarburization) process. Author (ESA)

N83-30616*# National Aeronautics and Space Administration, Washington, D. C.
PROCESS FOR THE PRODUCTION OF METAL NITRIDE SINTERED BODIES AND RESULTANT SILICON NITRIDE AND ALUMINUM NITRIDE SINTERED BODIES
Seishi Yajima, Mamoru Omori, Josaburo Hayashi, Hideo Kayano, and Masaaki Hamano May 1983 39 p Transl. into ENGLISH of German Patent no. 2646694 (15 Oct. 1976) p 1-45 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77253; NAS 1.15:77253) Avail: NTIS HC A03/MF A01 CSCL 11F

A process for the manufacture of metal nitride sintered bodies, in particular, a process in which a mixture of metal nitrite powders is shaped and heated together with a binding agent is described. Of the metal nitrides Si3N4 and AIN were used especially frequently because of their excellent properties at high temperatures. The goal is to produce a process for metal nitride sintered bodies with high strength, high corrosion resistance, thermal shock resistance, thermal shock resistance, and avoidance of previously known faults. B.G.

N83-30617# British Library Lending Div., Boston Spa (England).
MATHEMATICAL MODEL OF SOLIDIFICATION OF BINARY ALLOYS
F. V. Nedopekin and S. S. Petrenko 14 Jun. 1983 63 p refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved. Chern. Met. (USSR), no. 7, 1982 p 158
(BLL-M35039-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

A closed system of dimensionless equations for transfer of the average temperature and solid phase fraction was obtained. Author

N83-30618# National Materials Advisory Board, Washington, D.C. Commission on Engineering and Technological Systems.
DYNAMIC COMPACTION OF METAL AND CERAMIC POWDERS Final Report
Vonne D. Linse, Oswald R. Bergmann, Carl F. Cline, Jim D. Mote, Hayne Palmour, III, Thomas Vasilos, Man F. Yan, Gordon Bruggeman, Steve H. Carpenter, Thomas K. Glasgow et al Mar. 1983 104 p refs
(Contract MDA903-82-C-0434)
(AD-A127371; NMAB-394) Avail: NTIS HC A06/MF A01 CSCL 11/6

The state of the art and the technological potential for the dynamic consolidation of metal and ceramic powders were assessed. Fundamental consideration of dynamic consolidation, consolidation phenomena during dynamic compaction, dynamic compaction and conditioning of metal and ceramic powders, characterization of dynamically consolidated metal and ceramic powders, computer codes applicable to dynamic compaction, practical and potential applications, problem areas, and the current position of the United States in dynamic compaction were examined. Based on its conclusions, the committee recommend that a systematic study of the dynamic compaction process should be conducted; existing techniques should be improved and new ones developed for monitoring of dynamic events as close to the microscale as possible for temperatures, shock velocities, pressures and particle motion data from systematic experiments should be utilized to form data information for modeling codes; coordination among those investigating dynamic compaction should be maintained; a sufficiently funded, sustained, coordinated, and concentrated research and development effort should be initiated to strengthen the United States position in the dynamic compaction field. Author (GRA)

N83-30619# Lehigh Univ., Bethlehem, Pa.
FATIGUE CRACK GROWTH AND SURFACE REACTIONS FOR TITANIUM ALLOYS EXPOSED TO WATER VAPOR Inst. of Fracture and Solid Mechanics.
S. J. Gao, G. W. Simmons, and R. P. Wei Mar. 1983 42 p refs
(Contract N00014-75-C-0543)
(AD-A127328; IFSM-83-116; TR-14) Avail: NTIS HC A03/MF A01 CSCL 11/6

Parallel fracture mechanics and surface chemistry studies have been carried out to develop understanding of environmentally assisted fatigue crack growth in titanium alloys. Room temperature crack growth response in water vapor was determined for annealed Ti-5Al-2.5Sn alloy and for Ti-6Al-4V alloy in the solution treated and solution treated plus over-aged conditions as a function of water vapor pressure from 0.266 to 665 Pa at a frequency of 5 Hz and a load ratio of 0.1. Reference data were obtained in vacuum. The kinetics of reactions of water vapor and oxygen with fresh surfaces of Ti-5Al-2.5Sn alloy were measured at room temperature. The results showed that the reactions with water vapor and with oxygen are both rapid; with an initial sticking coefficient of 1.0 for water vapor and of 0.54 to 0.84 for oxygen. The reaction with water vapor produced a monolayer of oxide (TiO), whereas 2 to 3 layers of TiO resulted from the reaction with oxygen. GRA

N83-30620# Naval Research Lab., Washington, D. C.
FATIGUE CRACK PROPAGATION IN AN HSLA STEEL (MF-80) IN AIR AND IN SALT WATER Interim Report
S. J. Gill and T. W. Crooker 21 Apr. 1983 25 p refs
(SF3422593)
(AD-A127423; NRL-MR-5048) Avail: NTIS HC A02/MF A01 CSCL 11/6

Fatigue crack propagation was studied in MF-80 HSLA steel in ambient room air and in 3.5 percent NaCl salt water. Region-II fatigue crack growth rate (da/dN) data were obtained at two load ratios, R=0.10 and R = 0.67. da/dN values were found to be affected by both load ratio and environment, with the greatest effect being caused by the combination of high load ratio and salt water environment. Overall, the results of this study suggest that MF-80 HSLA steel may have slightly less Region-II fatigue crack propagation resistance than other high-strength steels of comparable strength. GRA

N83-30621# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Mechanical Engineering.
POTENTIODYNAMIC POLARIZATION STUDIES OF AN Al-Mg-Li ALLOY
R. E. Ricker and D. J. Duquette Apr. 1983 18 p refs
(Contract N00014-75-C-0466; NR Proj. 036-093)
(AD-A126926) Avail: NTIS HC A02/MF A01 CSCL 07/4

Potentiodynamic polarization tests were compared for an Al-Mg-Li alloy and a 7000 series alloy (7050). Tests were performed in various concentrations of sodium chloride, sodium sulfate and sodium nitrate solutions as functions of scan rate, pH, temperature, and degree of aeration. The lithium containing alloy exhibited significantly more active corrosion potentials in neutral and acidic solutions while the pitting potentials were essentially the same for the two alloys. Author (GRA)

N83-30622# California Univ., Livermore. Lawrence Livermore Lab.
DETERMINATION OF STATIC FRICTION OF BERYLLIUM AND BERYLLIUM TO 1040 STEEL
R. I. Morrison Feb. 1983 10 p refs
(Contract W-7405-eng-48)
(DE83-007307; UCID-19687) Avail: NTIS HC A02/MF A01

The coefficients of static friction of beryllium to beryllium and beryllium to 1040 steel were determined in normal atmosphere and in dry argon atmosphere. Both the incline plane and horizontal opposing force methods were used. The agreement between the two methods, as well as the precision within each method, appears to be good. The results obtained in a dry argon atmosphere are still suspiciously low even after very careful and repeated experiments. DOE

N83-30623# Brookhaven National Lab., Upton, N. Y.
STRUCTURAL MAPS AND PARAMETERS IMPORTANT TO ALLOY PHASE STABILITY
R. E. Watson and L. H. Bennett (NBS, Washington, D.C.) 1982 7 p refs Presented at 6th Intern. Symp. on the Scientific Basis for Radioactive Waste Management, Boston, 1 Nov. 1982
(Contract DE-AC02-76CH-00016)
(DE83-005673; BNL-32407; CONF-821107-48) Avail: NTIS HC A02/MF A01

Maps which correlate the structures in which the compounds form as well as providing some indication of whether a compound forms at some given composition in the first place are considered. This class of map involves one coordinate which is the difference in an atomic parameter while the other is an average. This contrasts with Darken Gurry maps and Giessen's maps related to glass forming ability where both coordinates are differences. The situation for 50/50 transition metal alloys is reviewed and results are presented for systems off 50/50 composition. DOE

N83-30624# Notre Dame Univ., Ind. Dept. of Metallurgical Engineering and Materials Science.
MICROSTRUCTURAL EFFECTS IN ABRASIVE WEAR Final Report
T. H. Kosel, C. M. Rao, M. T. Fernandes, and N. F. Fiore 16 Mar. 1983 131 p refs
(Contract DE-AC02-77ET-10460)

(DE83-009365; DOE/ET-10460/T1) Avail: NTIS HC A07/MF A01

Quantitative relationships between microstructural variables and abrasion resistance of highly alloyed materials including high Cr-Mo white cast irons and Co-base alloys were established. Low stress abrasion resistance has been quantified using a rubber wheel abrasion test (RWAT) employing dry particles of semi rounded Ottowa quartz abrasive, crushed quartz abrasive, and crushed Al2O3 abrasive. Abrasion under fixed abrasive conditions was studied by a gouging abrasive wheel test (GAWT) which employs a bonded Al2O3 abrasive wheel. This test simulates high stress abrasion more closely than it does gouging abrasion, which includes repeated impact. DOE

N83-30625# Argonne National Lab., Ill.
HYDRIDES OF OXYGEN-STABILIZED INTERMETALLIC PHASES
M. H. Mendelsohn 1982 6 p refs Presented at World Hydrogen Energy Conf., Pasadena, Calif., 13 Jun. 1982
(Contract W-31-109-eng-38)
(DE83-007626; CONF-820605-27) Avail: NTIS HC A02/MF A01

Recent work on the hydrogen adsorption properties of Ti2Ni-type intermetallic phases containing oxygen is summarized. Preliminary work on the first Ti2Ni-type phase of composition A3B3O is presented. The hydrogen adsorption properties of the Zr-containing intermetallic compound Zr3V3O is compared to the hydrogen absorption properties of previously investigated Ti-containing compounds of composition Ti4M2O/sub x/ (M = Fe, Co, Ni; x = 0-1). The compound Zr3V3O has been found rapidly to absorb and desorb about 3 moles of hydrogen gas per mole of alloy. Enthalpies and entropies of solution are presented for nine different compositions of the hydride Zr3VOH/sub y/. Further studies of the hydrogen absorption properties of Zr3V3O/sub x/ are in progress. DOE

N83-30626# Ohio State Univ., Columbus. Dept. of Metallurgical Engineering.
THE GENERAL AND LOCALIZED CORROSION OF CARBON AND LOW-ALLOY STEELS IN OXYGENATED HIGH-TEMPERATURE WATER Final Report
D. D. Macdonald, S. Smialowska, S. Pednekar, T. Mizuno, and H. J. Choi Feb. 1983 73 p refs Sponsored by EPRI
(EPRI Proj. T115-5)
(DE83-901488; EPRI-NP-2853) Avail: NTIS HC A04/MF A01

The susceptibilities to stress corrosion cracking (SCC) of two carbon steels, SA106-grB and SA333-gr6, which are used in seamless piping, and a low-alloy pressure vessel steel, A508-C12, were studied in high purity water as a function of oxygen concentration (0.16 to 8 ppM) and temperature (50 to 2880C). The susceptibility to SCC was measured using the slow strain rate technique. The fracture surfaces of the test specimens were also examined using electron microscopy to determine the mode of failure. In water containing 1 and 8 ppM oxygen and at temperatures above 1350C, transgranular stress corrosion cracking was observed to occur in A508-C12, SA333-gr6 and SA106grB steels at very high stresses. The susceptibility to SCC increased with temperature. DOE

N83-30627# Argonne National Lab., Ill. Materials Science Div.
DEFECTS IN METALS
R. W. Siegel Jun. 1982 40 p refs Presented at the 2nd Natl. Symp. on Positron Annihilation, Madras, 8-12 Feb. 1982 Submitted for publication
(Contract W-31-109-eng-38)
(DE83-007638; CONF-820274-1) Avail: NTIS HC A03/MF A01

The application of positron annihilation spectroscopy (PAS) to the study of defects in metals led to increased knowledge on lattice-defect properties during the past decade in two areas: the determination of atomic defect properties, particularly those of monovacancies, and the monitoring and characterization of vacancy-like microstructure development during post-irradiation and post-quench annealing. The study of defects in metals by PAS is reviewed within the context of the other available techniques for defect studies. The strengths and weaknesses of PAS as a method for the characterization of defect microstructures are considered. The additional possibilities for using the positron as a localized probe of the atomic and electronic structures of atomic defects are discussed, based upon theoretical calculations of the annihilation characteristics of defect-trapped positrons and experimental observations. The present status and future potential of PAS as a tool for the study of defects in metals is considered. DOE

N83-30628# Oak Ridge National Lab., Tenn.
IN-REACTOR UNIAXIAL FRACTURE STRAIN OF 20 PERCENT-COLD-WORKED TYPE 316 STAINLESS STEEL
M. L. Grossbeck and E. E. Bloom 1983 4 p refs Presented at the Intern. Conf. on Dimensional Stability and Mech. Behavior of Irradiated Metals and Alloys, Brighton, England, 11 Apr. 1983
(Contract W-7405-eng-26)
(DE83-012071; CONF-830418-2) Avail: NTIS HC A02/MF A01

In-reactor creep strain and fracture strain were determined for type 316 stainless steel at 430, 550, and 6250 C. Specimens were irradiated in EBB-II to a fluence of 5 x 10 to the 26th power n/sq m (E < 0.1 MeV). Strain rates of 10 to the -10 power to 10 to the -9 power/s were achieved by using a swelling driven device to apply stress. Fracture strains of 6% at 5500 C and 1% at 6250 C were observed. All fractures were intergranular as expected for such low strain rates. DOE

N83-30629# Stanford Linear Accelerator Center, Calif.
FABRICATION OF TUNGSTEN WIRE NEEDLES
Antonio Roder Feb. 1983 3 p
(Contract DE-AC03-76SF-00515)
(DE83-012026; SLAC-TN-83-7) Avail: NTIS HC A02/MF A01

Fine point needles for field emission are conventionally produced by electrolytically or chemically etching tungsten wire. Points formed in this manner have a typical tip radius of about 0.5 microns and a cone angle of some 30 degrees. The construction of needle matrix detector chambers has created a need for tungsten needles whose specifications are: 20 mil tungsten wire, 1.5 inch total length, 3 mm-long taper (resulting in a cone angle of about 5 degrees), and 25 micro-radius point (similar to that found on sewing needles). In the process described here for producing such needles, tungsten wire, immersed in a NaOH solution and in the presence of an electrode, is connected first to an ac voltage and then to a dc supply, to form a taper and a point on the end of the wire immersed in the solution. The process parameters described here are for needles that will meet the above specifications. Possible variations will be discussed under each appropriate heading. DOE

N83-30630# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
MICROSTRUCTURAL INFLUENCE ON ABRASIVE WEAR RESISTANCE OF HIGH-STRENGTH, HIGH-TOUGHNESS MEDIUM-CARBON STEELS
C. K. Kwok and G. Thomas Sep. 1982 30 p refs Presented at the Intern. Conf. on Wear of Mater., Washington, 11-14 Apr. 1983
(Contract DE-AC03-76SF-00098)
(DE83-002571; LBL-14911; CONF-830402-2) Avail: NTIS HC A03/MF A01

A systematic study of abrasive wear resistance of Fe/Cr/Mn experimental steels has been carried out in two-body pin-on-disc abrasion tests. Silicon carbide, alumina, and quartz were used as abrasives. The relationships between microstructures, mechanical properties, and abrasive wear resistance for these expermental steels were studied. In addition, several commercial alloys were tested to provide a basis for comparison. Results show that dislocated lath martensite with continuous interlath film of retained austenite appears to be a desirable microstructure for good wear resistance. Grain refinement by double heat treatment was found to improve the toughness in the experimental steels but have little effect on the abrasive wear resistance. In general, superior tensile properties and wear resistance, without sacrifice in toughness, can be achieved by a lath martensitic microstructure. DOE

N83-30631# Los Alamos Scientific Lab., N. Mex.
DEFORMATION OF MICROSTRUCTURES DUE TO LOW-VELOCITY PARTICULATE EROSION OF DUCTILE METALS BY SPHERICAL PARTICLES
P. S. Follansbee, D. Banerjee (Carnegie-Mellon Univ.), and J. C. Williams (Carnegie-Mellon Univ.) 1983 29 p refs Presented at the Intern. Conf. on Wear of Mater., Washington, 11-14 Apr. 1983
(Contract W-7405-eng-36)
(DE82-021890; LA-UR-82-2428; CONF-830402-1) Avail: NTIS HC A03/MF A01

A cumulative damage model was developed for the low velocity, normal incidence, erosion of ductile metals by spherical particles. The model correlates the computed plastic strain distribution for different impact velocities and materials with the experimentally measured erosion rates. The surface and subsurface changes which occur in Cu and Cu-6 wt % Al specimens during erosion testing are described. Scanning and transmission electron microscopy were used to study these changes in order to determine whether the deformed microstructures are consistent with the predictions of the model. Because the deformation due to the impact of a 500m diameter spherical particle occurs at high strain rates (10 to the 6th power/s) and is also highly localized, the deformation mechanisms differ slightly from the bulk deformation reported for low strain rates. The contribution of strain localization (adiabatic sheer) and twinning is discussed in light of the microstructural observations. DOE

N83-30632# Monsanto Research Corp., Miamisburg, Ohio.
NONLIQUID SURFACE PREPARATION FOR ELECTRODEPOSITION
Gary V. Nesslage and Walter R. Schurman 10 Mar. 1983 6 p
(Contract DE-AC04-76DP-00053)
(DE83-008213; MLM-3041) Avail: NTIS HC A02/MF A01

A nonliquid method was developed to surface treat nonconductive material prior to electroplating. A comparison of this method with the conventional liquid method shows that the conventional method is a 21-step wet chemistry method, whereas the nonliquid method requires only seven steps to prepare a sensitized surface, and it can be performed by the deposition of material from the gaseous phase. The work accomplished to date, demonstrating the feasibility of the method, is presented. DOE

N83-30633# Argonne National Lab., Ill. Materials Science and Technology Div.
NOVEL METHOD FOR THE ELECTROLESS METALLIZATION OF POLYIMIDE: SURFACE OXIDATION OF ZINTL ANIONS
Robert C. Haushalter and Larry J. Krause Jan. 1983 24 p refs Presented at the 1st Tech. Conf. Polyimides, Ellensville, N.Y., 1 Nov. 1982
(Contract W-31-109-eng-38)
(DE83-007674; CONF-821174-1) Avail: NTIS HC A02/MF A01

Several methods for the chemical metallization of certain reducible organic polymers, particularly polyimide, are described. These methods depend on the very strong reducing power of the Zintl anions. Main group films can be prepared easily by treating the polymer with a solution of a Zintl anion. The main group deposition was shown to proceed by a substrate reduction/intercalation-deposition mechanism. Transition metal films can be prepared by the reaction of the appropriate metal cation with unmetallized, reduced, intercalated polyimide, K/sub x/ Plm. Bimetallic surfaces can be prepared by a combination of these methods using the polymer first as an oxidant, then a reductant. The general reactions types described also occur with many other substrates besides organic polymers. DOE

N83-30634# Argonne National Lab., Ill. Materials Science Div.
ORDERED ALLOYS REVEAL FUNDAMENTAL MECHANISMS OF NEUTRON-DAMAGE PRODUCTION
M. A. Kirk and T. H. Blewitt Apr. 1982 41 p refs Presented at the Intern. Conf. on Neutron Irradiation Effects, Argonne, Ill., 9-12 Nov. 1981
(Contract W-31-109-eng-38)
(DE83-007776; CONF-811145-15) Avail: NTIS HC A03/MF A01

Magnetic saturation measurements performed on Ni3Mn during neutron irradiations are reviewed and re-examined. Disordering during thermal-neutron bombardment at 50K uniquely reveals the existence, number and average length of replacement collision sequences. The (n, (BETA)) recoil spectrum in Ni3Mn is reanalyzed. It is concluded that 112 to 150 < 110 > replacements occur, within one or two sequences, per (n, (BETA)) recoil with an average energy of 492 eV. Similar measurements on Ni3Mn during fast-neutron bombardment at 50K yielded the total number of replacements per typical 30 keV cascade and demonstrated that very few interstitials were produced at large distances from the cascade by < 110 > replacement sequences. Results on high resolution TEM measurement of disordered zones in fast-neutron irradiated Cu3Au are discussed and compared with damage calculations for the accurately measured fast-neutron flux and energy spectrum in CP5. DOE

N83-30635# Argonne National Lab., Ill. Materials Science Div.
ION-IRRADIATION STUDIES OF CASCADE DAMAGE IN METALS
R. S. Averback Mar. 1982 38 p refs Presented at the Intern. Conf. on Neutron Irradiation Effects, Argonne, Ill., 9-12 Nov. 1981
(Contract W-31-109-eng-38)
(DE83-007645; CONF-811145-15) Avail: NTIS HC A03/MF A01

The fundamental aspects of cascade damage in metals are reviewed in an effort to determine the primary state of damage (i.e., the arrangement of atoms in the cascade region prior to thermal migration of defects). Progress was made towards understanding the damage function (i.e., the number of Frenkel pairs produced as a function of primary recoil atom energy), the spatial configuration of vacancies and interstitials in the cascade, and the cascade-induced mixing of atoms. It is concluded that the agitation of the lattice in the vicinity of energetic displacement cascades stimulates the defect motion and that such thermal spike motion induces recombination and clustering of Frenkel defects. DOE

N83-30636# SRI International Corp., Menlo Park, Calif.
ELECTROCHEMICAL MEASUREMENT OF CORROSION RATES IN CATHODICALLY PROTECTED SYSTEMS Final Report
M. C. H. McKubre Feb. 1983 60 p refs
(EPRI Proj. 1689-7)
(DE83-901467; EPRI-CS-2858) Avail: NTIS HC A04/MF A01

The use of harmonic analysis as a nondestructive, in situ method of measuring corrosion rates of cathodically protected components in the tube/tube sheet/water box region of steam surface condensers. A frequency response analyzer was used to measure the fundamental and harmonic current response to a sinusoidal voltage perturbation imposed on cylindrical specimens of CuNi alloys and titanium, in aerated synthetic ocean water. The results were analyzed using a mathematical procedure and computer program. Calculated corrosion rates were compared with direct mass loss measurements and good agreement was obtained. However, due to very small corrosion rates under cathodic protection, direct mass loss determinations include very large uncertainties. The corrosion rates computed from the harmonic analysis vary in the expected way with convection and cathodic protection potential. DOE

N83-30637# Materials Engineering Associates, Inc., Lanham, Md.
R-CURVE CHARACTERIZATION OF LOW-STRENGTH STRUCTURAL STEELS Final Report
B. H. Menke, A. L. Hiser, J. R. Hawthorne, and F. J. Loss Oct. 1982 86 p refs Sponsored by EPRI
(EPRI Proj. 2055-7)
(DE83-900579; EPRI-NP-2715) Avail: NTIS HC A05/MF A01

The fracture toughness of three, low strength, structural steels is determined. The relationships between fracture toughness, Charpy energy, drop weight and dynamic tear test results are investigated. The full fracture toughness transition curve is generated for each material. Wherever possible, the J resistance curves are developed. DOE

N83-30638# Idaho National Engineering Lab., Idaho Falls.
TEMPERATURE ESTIMATES FROM ZIRCALOY OXIDATION KINETICS AND MICROSTRUCTURES
C. S. Olsen Oct. 1982 49 p refs
(Contract DE-AC05-76ID-01570)
(DE83-002626; NUREG/CR-2807; EGG-2207) Avail: NTIS HC A03/MF A01

State of the art capability to determine peak zircaloy fuel rod cladding temperatures following an abnormal temperature excursion in a nucler reactor, based on postirradiation metallographic analysis of zircaloy microstructural and oxidation characteristics was reviewed. Results of a comprehesive literature search are presented to evaluate the suitability of available zircaloy microstructural and oxidation data for estimating anticipated reactor fuel rod cladding temperatures. Additional oxidation experiments were conducted to evaluate low temperature zircaloy oxidation characteristics for postirradiation estimation of cladding temperature by metallographic examination. Results of these experiments were used to calculate peak cladding temperatures of electrical heater rods and nuclear fuel rods that were subjected to reactor temperature transients. DOE

N83-30639# Sandia Labs., Albuquerque, N. Mex.
MICROSTRUCTURE AND MECHANICAL PROPERTIES OF PRECIPITATION-HARDENED ALUMINUM UNDER HIGH RATE DEFORMATION
Dennis E. Grady, James R. Asay, Richard W. Rohde, and Jack L. Wise 1982 14 p refs Presented at the 29th Ann. Sagamore Army Mater. Res. Conf., Lake Placid, N. Y. 19 Jul. 1982
(Contract DE-AC04-76DP-00789)
(DE83-002870; SAND-82-1627C; CONF-820725-3) Avail: NTIS HC A02/MF A01

In recent years the shock deformation properties of a precipitation hardened aluminum alloy (6061-T6) have been investigated extensively with time resolved wave profile gauges. Studies have revealed complicating features of the shock deformation process not easily explained by existing theories of plastic deformation. Specifically, unusual behavior in the dynamic hardness or strength, post shock hardness, steady wave viscosity, and post shock microstructure has been observed over the shock pressure range of 1 to 15 GPa. The deformation structure suggests that microscopic heterogeneity in the deformation and temperature state during dynamic compression may be responsible for the observed effects. We have undertaken a study to correlate the shock compression and quasistatic deformation of 6061-T6 aluminum. Recovered specimens which have been shock loaded are examined metallurgically, and results are compared with both static and dynamic mechanical property measurements. DOE

N83-30640# California Univ., Livermore. Lawrence Livermore Lab.
SURFACE PREPARATION AND PLATING
J. W. Dini, F. B. Waldrop (Oak Ridge Y-12 Plant, Tenn.), and R. W. Reno 6 Oct. 1982 54 p refs Presented at the Soc. of Photo Opt. Instrumentation Engr. Advanced Seminar Inst. on Diamond Turning, Pajara Dunes, Calif., 1 Jan. 1982
(Contract W-7405-eng-48)
(DE83-001190; UCRL-88199; CONF-820159-1) Avail: NTIS HC A04/MF A01

This chapter covers electroplating and electroless nickel plating since coatings of this type play an important role in diamond turning technology. Items to be discussed include preparation of substrates prior to coating, plating defects such as pits and nodules and their influence on optics, the influence of stress in coatings, plating details for copper, gold, silver, and electroless nickel, and the importance of additives and their influence on grain size and structure of deposits. Some comments are made on future challenges that could be presented to the plating community to further improve the quality of coatings applied for diamond turning purposes. DOE

N83-30641# Sandia Labs., Albuquerque, N. Mex.
SHOCK-ACTIVATED SINTERING
R. A. Graham, E. K. Beauchamp, B. Morosin, E. Venturini, D. M. Webb, and L. W. Davison 1982 40 p refs Presented at the DARPA Dyn. Synthesis Program Review Meeting, Albuquerque, N. Mex., 5 Aug. 1982
(Contract DE-AC04-76DP-00789)
(DE83-001788; SAND-82-2335C; CONF-820895-1) Avail: NTIS HC A03/MF A01

This report describes initial progress on shock activated sintering of inorganic powders, TiC, TiB2, AlN and Al2O3. After background material is presented, technical activities on controlled shock loading, studies of physical properties of shocked powders and sintering studies are presented. DOE

N83-30642# California Univ., Livermore. Lawrence Livermore Lab.
HIGH-TEMPERATURE OXIDATION OF ION-IMPLANTED TANTALUM
E. M. Kaufmann, R. G. Musket, J. J. Truhan, K. S. Grabowski (NRL, Washington D.C.), I. L. Singer (NRL, Washington, D.C.), and C. R. Gossett (NRL, Washington, D.C.) 15 Sep. 1982 27 p refs Presented at the Intern. Conf. on Ion Beam Modification of Mater., Grenoble, France, 6-10 Sep. 1982 Submitted for publication
(Contract W-7405-eng-48)
(DE83-000747; UCRL-87500; CONF-820945-4) Avail: NTIS HC A03/MF A01

The oxidation of ion implanted Ta in two different high temperature regimes was studied. Oxidations were carried out at 500 C in Ar/O2 mixtures, where oxide growth is known to follow a parabolic rate law in initial stages, and at 1000 C in pure O2, where a linear rate behavior obtains. Implanted species include Al, Ce, Cr, Li, Si and Zr at fluences of the order of ten to the seventeenth power/sq cm. Oxidized samples were studied using Rutherford backscattering, nuclear reaction analysis, Auger spectroscopy, secondary ion mass spectroscopy, X ray diffraction and optical microscopy. Significant differences among the specimens were noted after the milder 500 C treatment, specifically, in the amount of oxide formed, the degree of oxygen dissolution in the metal beneath the oxide, and in the redistribution behavior of the implanted solutes. Under the severe 1000 C treatment, indications of different solute distributions and of different optical features were found, whereas overall oxidation rate appeared to be unaffected by the presence of the solute. DOE

N83-30643# Sandia Labs., Albuquerque, N. Mex.
AMORPHOUS Al(Ni) ALLOY FORMATION BY PULSED-ELECTRON-BEAM QUENCHING
S. T. Picraux and D. M. Follstaedt 1982 6 p refs Presented at the 6th Intern. Symp. on the Sci. Basis for Radioactive Waste Management, Boston, 1 Nov. 1982
(Contract DE-AC04-76DP-00789)
(DE83-002141; SAND-82-1475C; CONF-821107-17) Avail: NTIS HC A02/MF A01

The microstructural transition from the epitaxial crystalline to amorphous state as a function of Ni concentration is examined in Al(Ni) alloys formed by ion implantation and e-beam melt quenching. The evolution from epitaxial crystalline Al at $<$ or $=$ 3.5 at. % Ni to amorphous phase formation at 15 to 30 at. % Ni is characterized in detail for 8, 10 and 12% Ni uniform concentration samples by ion channeling and transmission electron microscopy. The transition occurs via complete loss of epitaxial regrowth at 9 at. % and the formation of a fine-grained polycrystalline Al, with grain size decreasing with increasing Ni from 20 to 100 A at 10% Ni concentration to $<$ or $=$ 10 to 50 A at 12% Ni. DOE

N83-30644# Sandia Labs., Albuquerque, N. Mex.
MEASURING BACK STRESSES IN COMMERCIAL ALLOYS AT ELEVATED TEMPERATURES MF
Wendell B. Jones and R. W. Rohde 1982 40 p refs Presented at the TMS/AIME Fall Meeting, St. Louis, 24 Oct. 1982
(Contract DE-AC04-76DP-00789)
(DE83-001787; SAND-82-0728C; CONF-821049-4) Avail: NTIS HC A03/MF A01

Strain transient dip tests have been conducted on two commercial heats of Alloy 800 at 922 K. Tests were conducted on both a servo-controlled hydraulic machine and a specially designed dip test machine. Using measured maximum strain changes during dips allowed unambiguous definition of a kinematic variable. The several other methods of interpreting dip test data by attempting to measure strain rates shortly after the unloading decrements were found not to be satisfactory. The nature of the instantaneous unloading strains and the strain transients following unloading are also discussed in terms of the mechanisms of deformation in Alloy 800. DOE

N83-30645# National Bureau of Standards, Washington, D.C. National Measurement Lab.
RECYCLING MUNICIPAL FERROUS SCRAP
James G. Early Sep. 1982 36 p refs
(PB83-157644; NBSIR-82-2571) Avail: NTIS HC A03/MF A01 CSCL 11F

The real and potential markets for increased consumption of municipal ferrous scrap are discussed in terms of these barriers together with the important role of standards for municipal ferrous scrap in improving communications between buyers and sellers. Ferrous scrap recovered from municipal solid waste is one of the new sources of old scrap that may satisfy increased demands. Systems for the recovery of the ferrous fraction from municipal solid waste were developed, although increased usage of municipal ferrous scrap was very slow due to institutional and technical barriers. The technical barriers posed by the physical and chemical characteristics of municipal ferrous scrap strongly inhibit the development of markets for this new material. GRA

N83-30646# Bureau of Mines, Avondale, Md.
PREDICTED CHARACTERISTICS OF WASTE MATERIALS FROM THE PROCESSING OF MANGANESE NODULES
Benjamin W. Haynes and Stephen L. Law Nov. 1982 17 p refs
(PB83-156810; BM-IC-8904) Avail: NTIS HC A02/MF A01 CSCL 11F

As part of the first-order assessment of potential manganese nodule processing reject waste materials, the Bureau of Mines estimated the physical and chemical characteristics of reject waste materials that would be generated from each of five potential process flow-sheets. These processes were chosen because of their economic and technical feasibility for first-generation nodule processing. A brief description of the five processes is given to show process inputs and outputs. The physical characteristics are predicted based on land-based laterite processing where applicable, and where no land-based analog exists, on the basis of process chemistry. Author (GRA)

N83-30647# Indian Inst. of Tech., Bombay.
RECENT ADVANCES IN MATERIAL RESEARCH
Dec. 1982 158 p refs Proc. of the Jubilee Commemoration Seminary, Bombay, 20-22 Dec. 1982
(PB83-163873) Avail: NTIS HC A08/MF A01 CSCL 11F

Abstracts of various papers presented in the seminar are included. The broad topics covered are: special steels and superalloys, composite materials, high temperature ceramics, high strength materials, fibers and matrices, hard and soft magnetic materials, amorphous magnetic materials, and ferrites and garnets. GRA

N83-30648# Central Electrochemical Research Inst., Karaikudi (India).
CORROSION BULLETIN, VOLUME 2, NUMBER 7
K. S. Rajagopalan, ed. Nov. 1982 50 p refs
(PB83-168138) Avail: NTIS HC A03/MF A01 CSCL 11F

The bulletin contains information on the following subjects: Corrosion problems of ships; Corrosion rate measuring techniques Faradaic rectification; Corrosion rate measuring meters; Insitu spectro-electrochemical studies; Environmental factors influencing corrosion part 1-Atmospheric corrosion; General aspects of anodizing; Shop problems; Recent developments in plating; Basic aspects of electroplating; and Proceedings of the get-together with electroplating and metal finishing industry. GRA

N83-30649# National Materials Advisory Board, Washington, D.C. Panel on Assessment of Titanium Availability.
TITANIUM: PAST, PRESENT AND FUTURE Final Report
Jan. 1983 218 p refs
(Contract EMW-C-0008)
(PB83-171132; NMAB-392) Avail: NTIS HC A10/MF A01 CSCL 11F

The capabilities of the United States to meet current and anticipated needs for titanium and its alloys are assessed. The various production steps from ore through mill products are examined both historically and for their adequacy to meet perceived future demands. Bottlenecks throughout this production cycle are identified and promising solutions to problems are put forward. Encouraging evidence of recent U.S. private enterprise entrepreneurial activities is noted. End uses of titanium mill products are reviewed historically as a basis to anticipate future developments and requirements. Technological opportunities and the role of innovation in the future of titanium are examined and several good prospects are perceived. The close relationship of U.S. government agencies with the U.S. titanium industry from its start three decades ago is reviewed. Recommendations are made that would permit the industry to serve the nation even better in the future. GRA

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N83-30650 Propellants, Explosives and Rocket Motor Establishment, Westcott (England). Plastics Federation Joint Working Party on the Ageing and Weathering of Polymers and Composites.
THE WEATHERING OF PLASTICS MATERIALS IN THE TROPICS. PART 7: EVALUATION OF THE WEATHERING BEHAVIOR OF A VARIETY OF GLASS REINFORCED POLYESTER AND EPOXY RESIN SYSTEMS
Oct. 1982 60 p
(BR85980) Copyright. Avail: Issuing Activity

Polyester and epoxy resins, woven roving, chopped strand mat and satin weave glass reinforcing materials were exposed to hot wet and hot dry climates for 8 years. The hot wet environment is the most aggressive condition for all the glass fiber resin systems. The methyl ethyl ketone peroxide cured low reactivity polyester resin system is superior to the other polyester resin systems. Epoxy resin systems with property losses of up to 40% weather better than polyester resin systems with property losses of up to 70%. The methyl nadic anhydride cured system shows the least loss of property of the epoxy resin systems.
Author (ESA)

N83-30651*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CHEMICAL APPROACH FOR CONTROLLING NADAMIDE CURE TEMPERATURE AND RATE Patent Application
Richard W. Lauver, inventor (to NASA) Filed 22 Jul. 1983 19 p
(NASA-Case-LEW-13770-2; US-Patent-Appl-SN-516217) Avail: NTIS HC A02/MF A01 CSCL 11G

Polyimide resins suitable for use as composite matrix materials are formed by copolymerization of maleic and norbornenyl endcapped monomers and oligomers. The copolymers can be cured at temperatures under about 300 C by controlling the available concentration of the maleic end-capped reactant. This control can be achieved by adding sufficient amounts of said maleic reactant, or by chemical modification of either copolymer, so as to either increase Diels-Alder retrogression of the norbornenyl capped reactant and/or holding initiation and polymerization to a

rate compatible with the availability of the maleic-capped reactant. NASA

N83-30652# Materials Research Labs., Melbourne (Australia).
FOULING AND BORING OF GLASS REINFORCED PLASTIC-BALSA BLOCKS IN A TROPICAL MARINE ENVIRONMENT
J. A. Lewis and D. J. Hall Mar. 1983 21 p refs
(MRL-R-874; AR-003-284) Avail: NTIS HC A02/MF A01

Test blocks constructed of balsa wood coated on each side with a layer of glass reinforced plastic (GRP) were exposed in a tropical marine harbor for 14 months. Undamaged controls and blocks with simulated minor and major damage to the GRP coating were either fully or half immersed. Molluscan borers, mostly teredinids, penetrated and damaged the balsa cores of all blocks examined, with greatest damage to fully immersed major damage blocks. Fouling growth covered all submerged GRP surfaces but had no apparent effect on the coating. Author

N83-30653*# National Aeronautics and Space Administration, Washington, D. C.
METHOD FOR CLASSIFYING CERAMIC POWDER
K. Takabe May 1983 6 p Transl. into ENGLISH of Japanese Patent no. 55-11022 (Appl. no. 53-83390, 7 Jul. 1978) p 103-105 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-77237; NAS 1.15:77237) Avail: NTIS HC A02/MF A01 CSCL 11B

Under the invented method, powder A of particles of less than 10 microns, and carrier powder B, whose average particle diameter is more than five times that of powder A, are premixed so that the powder is less than 40 wt.% of the total mixture, before classifying. Author

N83-30654*# National Aeronautics and Space Administration, Washington, D. C.
METHOD FOR PRODUCING A COMPRESSED BODY OF MIX-POWDER FOR CERAMIC
Kazuki Okawa May 1983 8 p Transl. into ENGLISH of Japanese Patent no. 57-82164 (Appl. no. 55-158697, 11 Nov. 1980) p 383-386 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-77238; NAS 1.15:77238) Avail: NTIS HC A02/MF A01 CSCL 11B

Under the invented method, a compressed body of mix powder for ceramic is produced by mixing and stirring several raw powder materials with mixing liquid such as water, and, in the process of sending the resulted viscous material pressurized at 5 kg/cm to 7 kg/cm, using 1.5 to 2 times the pressure to filter and dehydrate, adjusting the water content to 10 to 20%. Author

N83-30655*# National Aeronautics and Space Administration, Washington, D. C.
BURDEN FOR MANUFACTURE OF CERAMIC MATERIAL
T. V. Chechenya and Ye. A. Osipova May 1983 5 p Transl. into ENGLISH from Bull. Izobreteniy (USSR), no. 13, 5 May 1979 2 p Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77255; NAS 1.15:77255) Avail: NTIS HC A02/MF A01 CSCL 11B

A Soviet invention is discussed. The invention refers to ceramic materials which can be obtained by methods of powder metallurgy and can be used in high temperature technology. L.F.M.

N83-30656*# National Aeronautics and Space Administration, Washington, D. C.
A METHOD FOR GRANULATION OF A CERAMIC POWDER BODY
Ichitei Yoshida, Seiichi Takahashi, and Sanzo Shimai Jun. 1983 8 p Transl. into ENGLISH of Japanese Patent no. 56-31306 (20 Jul. 1981) p 131-132 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77256; NAS 1.15:77256) Avail: NTIS HC A02/MF A01 CSCL 11B

The granulation of a ceramic powder body method is described. This method is suitable for pressed powder and molds. A ceramic granulated powder is obtained with superior filling ability. S.L.

N83-30657*# National Aeronautics and Space Administration, Washington, D. C.
A METHOD FOR PURIFYING CERAMIC POWDER FOR ELECTRONIC PARTS
Mitsuo Murata Jun. 1983 6 p Transl. into ENGLISH of Japanese Patent no. 55-19006 (23 May 1980) p 21-22 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77257; NAS 1.15:77257) Avail: NTIS HC A02/MF A01 CSCL 11B

A method for purifying ceramic powder for electronic parts is described. Impurities can be easily removed by this method. Alkaline metals are removed from ceramic power for electronic parts. Author

N83-30658*# National Aeronautics and Space Administration, Washington, D. C.
BINDING AGENT FOR MOLDING CERAMIC ITEMS
B. D. Beshentsev, N. P. Vityuk, A. V. Volkov, A. I. Yevdokimov, M. N. Novikov, Ye. G. Piskunov, E. P. Pobortsev, and L. M. Sadovnichaya May 1983 6 p Transl. into ENGLISH of Russian Patent no. 885218 (30 Jan. 1980) 2 p Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77250; NAS 1.15:77250) Avail: NTIS HC A02/MF A01 CSCL 11G

The invention refers to the fabrication of ceramic items by the molding method. It can be used to produce items of complicated configuration, in particular composition of binding agent for electroceramic items. Author

N83-30659*# National Aeronautics and Space Administration, Washington, D. C.
ORGANOMETALIC CARBOSILANE POLYMERS CONTAINING VANADIUM AND THEIR PREPARATION
S. Yajima, K. Okamura, T. Shishido, and K. Fukuda May 1983 23 p Transl. into ENGLISH of French Patent no. 2480736 (16 Apr. 1981) p 1-21 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77252; NAS 1.15:77252) Avail: NTIS HC A02/MF A01 CSCL 11G

The present invention concerns a new organometallic polymer material containing in part a vanadium-siloxane linkage (V-0-Si), which has excellent resistance to heat and oxidation and a high residue ratio after high temperature treatment in a non-oxidizing atmosphere, for example, nitrogen, argon, helium, ammonia, or hydrogen. Author

N83-30660*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
USE OF HIGH L.E.T. RADIATION TO IMPROVE ADHESION OF METALS TO POLYTETRAFLUOROETHYLENE
Donald R. Wheeler and Stephen V. Pepper [1982] 15 p refs Presented at the 5th Biennial Carl S. Marvel Symp. on Polymer Surface Anal., Tucson, Ariz., 14-15 Mar. 1983; sponsored by the Am. Chem. Soc.
(NASA-TM-83413; E-1701; NAS 1.15:83413) Avail: NTIS HC A02/MF A01 CSCL 11B

MgK alpha X-rays (1254 eV) and 2 keV electrons irradiate the surface of polytetrafluoro ethylene (PTFE). The damage is confined to a few tenths of a micron below the surface, and the doses exceed 10 to the eight power rad. X-ray Photoelectron Spectroscopy (XPS) of the irradiated surfaces and mass spectroscopy of the gaseous products of irradiation indicate that the damaged layer is crosslinked or branched PTFE. After either type of

irradiation, the surface has enhanced affinity for metals and a lower contact angle with hexadecane. Tape pull tests show that evaporated Ni and Au films adhere better to the irradiated surface. XPS shows the Ni interacts chemically with PTFE forming NiF2 and possibly NiC. However, the gold adhesion and contact angle results indicate that the interaction is, at least in part, chemically nonspecific. Decreased contact angles on FEP Teflon crystallized against gold were attributed to either the presence of a polar oxygen layer or increased physical forces due to greater density. In the case of irradiated PTFE, no oxygen on the surface was observed. The crosslinked structure might, however, have a greater density, thus accounting for the observed increase in adhesion and wettability. Author

N83-30661*# National Aeronautics and Space Administration, Washington, D. C.
PRACTICAL ASPECTS OF THE USE OF PHOSPHATE BINDING MATERIALS IN REFRACTORY MIXTURES, MORTARS AND PUTTIES
Blazej Soltysik, Alicja Pawelek, and Elzbieta Witkowska Jun. 1983 11 p refs Transl. into ENGLISH from Polska Akad. Nauk Oddzial w Krakowie, Prace Komiski Ceram. Ser. Ceram. (Poland), v. 28, 1978 p 101-107 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-77063; NAS 1.15:77063) Avail: NTIS HC A02/MF A01 CSCL 11G

Phosphate binders, particularly acidic phosphates of Al and Cr, are used for binding Al silicate refractories used for lining of burners, SiC refractories, and refractory mortars. The binders have apparent d. 2.13-2.18 g/cu cm, porosity 21.4-23.8%, compressive strength 223 71 kg/ sq cm, total shrinkage 0.2-0.8%, and refractoriness 1240 deg. Author

N83-30662*# Ford Motor Co., Dearborn, Mich. Research Staff.
EVALUATION OF CERAMICS FOR STATOR APPLICATIONS: GAS TURBINE ENGINES INTERIM REPORT. STATOR FABRICATION AND EVALUATION Final Report
N. Arnon and W. Trela Mar. 1983 67 p refs
(Contract DEN3-0019)
(NASA-CR-168140; DOE/NASA/0019-83/1; NAS 1.26:168140) Avail: NTIS HC A04/MF A01 CSCL 11B

The objective was to assess current ceramic materials, fabrication processes, reliability prediction, and stator durability when subjected to simulated automotive gas turbine engine operating conditions. Ceramic one-piece stators were fabricated of two materials, silicon nitride and silicon carbide, using two near-net-shape processes, slip casting and injection molding. Non-destructive evaluation tests were conducted on all stators identifying irregularities which could contribute to failures under durability testing. Development of the test rig and automatic control system for repeatably controlling air flow rate and temperature over a highly transient durability duty cycle is discussed. Durability results are presented for repeated thermal cycle testing of the ceramic one-piece stators. Two duty cycles were used, encompassing the temperature ranges of 704 to 1204 C (1300 to 2200 F) and 871 to 1371 C (1600 to 2500 F). Tests were conducted on 28 stators, accumulating 135,551 cycles in 2441 hours of hot testing. Cyclic durability for the ceramic one-piece stator was demonstrated to be in excess of 500 hours, accumulating over 28,850 thermal cycles. Ceramic interface forces were found to be the significant factor in limiting stator life rather than the scatter in material strength properties or the variation in component defects encountered. R.J.F.

N83-30663# California Univ., Los Angeles. School of Engineering and Applied Science.
PREPARATION AND PROPERTIES OF HALIDE GLASSES AND GLASS-POLYMER COMPOSITES Final Technical Report
John D. MacKenzie 1982 35 p refs
(Grant AF-AFOSR-0059-80; AF Proj. 2303)
(AD-A127404; AFOSR-83-0227TR; UCLA-ENG-82-19) Avail: NTIS HC A03/MF A01 CSCL 11/4

Research has been carried out on two families of solids. The first one involves fluoride, chloride and bromide glasses. The second one involves microporous silica glass impregnated with organic polymers as well as inorganic crystals. The viscosity, vibrational spectra, chemical durability, fiber preparation and effects on oxygen on the properties of fluorozirconates have been studied. A number of new halide glasses were discovered. Microporous silica glass impregnated with PMMA was found to be highly transparent in the visible and possesses abnormal properties. Many crystals impregnated into silica glass were found to have their melting points depressed and some crystallographic transitions were also suppressed. GRA

N83-30664# Pratt and Whitney Aircraft, West Palm Beach, Fla. Government Products Div.
CORROSION INHIBITING ENGINE OILS, PART 2 Final Report, 2 Dec. 1980 - 1 Sep. 1982
Paul A. Warner, Grayson C. Brown, R. J. Meehan, and W. J. Purvis Wright-Patterson AFB, Ohio AFWAL Dec. 1982 81 p refs
(Contract F33615-79-C-5089)
(AD-A126914; AFWAL-TR-81-4028-PT-2;
PWA/GPD/FR-16595-PT-2) Avail: NTIS HC A05/MF A01 CSCL 11/8

In anticipation of corrosion problems during long term storage of F-107 gas turbine engines in air launched cruise missiles, a program was undertaken to develop a corrosion inhibiting engine oil with performance characteristics at least equal to those specified by MIL-L-7808H. Program objectives included development and validation of an accelerated corrosion test procedure, evaluation of representative samples of various chemical classes of potential corrosion inhibiting compounds, and complete characterization of the most promising formulation. An accelerated Corrosion Rate Evaluation Procedure was developed and validated through correlation with the humidity cabinet corrosion test described in the MIL-C-8188C specification. A total of 102 potential corrosion inhibitors were evaluated in single additive and two additive combinations in qualified MIL-L-7808H lubricants. Several very promising formulations were developed and evaluated, leading to the development of a formulation which provides corrosion protection superior to that of MIL-C-8188C and conforms to all MIL-L-7808H requirements specified in the statement of work, except that of total acid number. GRA

N83-30665# Bendix Corp., Kennedy Space Center, Fla.
NONTOXIC POLYIMIDES Final Report
D. R. Jamieson Jan. 1983 32 p refs
(Contract DE-AC04-76DP-00613)
(DE83-006933; BDX-613-2713) Avail: NTIS HC A03/MF A01

A unique bismaleimide resin, termed APO-BMI, used as a binder in the fabrication of syntactic foam parts, was developed using nontoxic raw materials. It is found that APO-BMI may be used in compression molding and mold to size applications. DOE

N83-30666# California Univ., Livermore. Lawrence Livermore Lab.
PROCESSING, CURE REACTIONS, NETWORK STRUCTURES AND MECHANICAL PROPERTIES OF TGDDM/DDS EPOXIES
Roger J. Morgan, James A. Happe, and Eleno T. Mones Dec. 1982 13 p refs Presented at the 28th Natl. Soc. for the Advancement of Mater. Process Engr. Symp., Anaheim, Calif., 12-14 Apr. 1983
(Contract W-7405-eng-48)
(DE83-004804; UCRL-88513; CONF-830408-1) Avail: NTIS HC A02/MF A01

Diaminodiphenyl methane (TGDDM) epoxies are the most common composite matrices utilized in high performance fibrous composites. Recent studies on the characterization of these epoxies from the processing and durability viewpoints are described. The effects of DDS concentration, HF3:NH2C2H5 catalyst composition, TGDDM impurities, and prepreg mixing conditions on the processing of the composite, cure reactions, and the resultant

chemical and physical structure of TGDDM-DDS epoxies are presented. DOE

N83-30667# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Metallurgy and Materials Science.
PLASTIC DEFORMATION IN OXIDE CERAMICS Final Report
A. H. Heuer Dec. 1982 8 p
(Contracts DE-AC02-77ER-04217; EG-77-S-4217)
(DE83-011047; DOE/ER-04217/7; COO-4217-7) Avail: NTIS HC A02/MF A01

Plastic deformation in oxygen rich UO/sub 2+x/ and Al rich Mg-Al spinels, was studied. In spinel, both stoichiometric and nonstoichiometric crystals were deformed at elevated temperatures and climb and climb dissociation of < 110 > dislocation was ubiquitous. The marked composition softening in this system, was attributed to an intrinsic decrease of the stacking fault energy for glide dissociation with increasing Al/Mg ratio. In UO/sub 2+x/, the effects of O/U ratio on single crystals oriented either to suppress or promote <(100)> slip are described. Either (111) <110> or (100)<110> slip can occur; the former is favored at low tempertures and high C/U ratios. The critical resolved shear stress for (111) slip decreases with increasing O/U ratio, while that for (100) slip is nearly constant with O/U ratio. Defect complexes are present in such oxygen rich crystals and may reorient in the stress fields of moving dislocations. DOE

N83-30489*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
EFFECTS OF LONG DURATION EXPOSURE TO SIMULATED SPACE ENVIRONMENT ON NONMETALLIC MATERIALS PROPERTIES
Charles L. Peacock, Jr. and Ann F. Whitaker *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 14 p refs (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01 CSCL 11G

N83-30495# Toronto Univ., Downsview (Ontario). Inst. for Aerospace Studies.
THE EFFECT OF COMBINED U.V. RADIATION AND HIGH ENERGY ELECTRONS ON THE BEHAVIOUR OF POLYMER MATRIX COMPOSITES IN HARD VACUUM
R. C. Tennyson, B. A. W. Smith, and L. P. Hebert *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 12 p refs Sponsored in part by Natural Sciences and Engineering Research Council of Canada (For primary document see N83-30479 19-12)
(Grant AF-AFOSR-3694-78)
Avail: NTIS HC A10/MF A01

N83-30702*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STRUCTURAL CHARACTERISTICS OF THE SHUTTLE ORBITER CERAMIC THERMAL PROTECTION SYSTEM
Paul A. Cooper *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 101-110 refs (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 11C

N83-30703*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SHUTTLE TILE ENVIRONMENTS AND LOADS
Ralph J. Muraca *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 111-125 refs (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 11C

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N83-30668 Prins Maurits Lab. TNO, Rijswijk (Netherlands).
WORK REGULATION TO DETERMINE THE PLASTICITY OF PLASTIC EXPLOSIVES [WERKVOORSCHRIFT VOOR DE BEPALING VAN DE KNEEDBAARHEID VAN KNEEDSPRINGSTOFFEN]
M. A. vanGool and H. W. R. Sabel Mar. 1982 21 p In DUTCH; ENGLISH summary
(Contract A80/KL/144)
(PML-1982-14; TDCK-77126) Copyright. Avail: Issuing Activity

The instructions for the performance of inspections, based on an investigation of inspection criteria for the plasticity of plastic explosives are given. The apparatus used is a Haake consistometer. A manual for the use of chemicals and equipment is presented. All manipulations are described step by step. The inspection has to be done at different temperatures. The calculation of plasticity parameters is outlined. Author (ESA)

N83-30669 Prins Maurits Lab. TNO, Rijswijk (Netherlands).
INVESTIGATION OF EXPLOSIVE TRAINS. PART 11: APPLICATION OF THE ROBBINS-MONRO AND OTHER STATISTICAL METHODS TO DETERMINE THE SENSITIVITY OF PERCUSSION PRIMERS [ONDERZOEK DETONATIEKETENS. 11: TOEPASSING VAN DE ROBBINS-MONRO EN ANDERE STATISTISCHE METHODEN VOOR HET BEPALEN VAN DE GEVOELIGHEID VAN SLAGHOEDJES]
H. W. L. Bruckman Apr. 1981 29 p refs In DUTCH; ENGLISH summary
(Contract A78/KL/009)
(PML-1981-16-Pt-11; TDCK-77030) Copyright. Avail: Issuing Activity

The results of drop experiments with percussion primers where explosion probability is a function of the drop height between steel ball and firing pin are given. Several statistical methods (Robbins-Monro, up and down, Langlie, up and down transformed response, and one shot transformed response) were used to determine percentage points of the probability function: 50% and 90% and for Robbins-Monro 99% also. The methods were compared. The usefulness of the Robbins-Monro method is confirmed. Author (ESA)

N83-30670# Materials Research Labs., Melbourne (Australia).
THE 4, 6-DINITROBENZOFUROXAN, AN IMPORTANT EXPLOSIVE INTERMEDIATE
Robert J. Spear, William P. Norris, and Roger W. Read Feb. 1983 13 p refs
(MRL-TN-470; AR-003-058) Avail: NTIS HC A02/MF A01

The preparation of 4,6-dinitrobenzofuroxan (DNBF) from either benzofuroxan or picryl chloride is described. Batches of up to 20 g have been obtained in suitable crystalline form via recrystallization from a number of solvents. DNBF exhibits impact and electrostatic sensitivity characteristics of a sensitive secondary, such as RDX, and should be handled accordingly. Ignition of small samples (< 200 mg) results only in deflagration; detonation can be achieved by the strong shock from deonating lead azide but power output appears to be significantly lower than RDX. M.G.

N83-30671# Army Medical Bioengineering Research and Development Lab., Fort Detrick, Md.
HPLC ANALYSIS OF SEX, HMX, TAX, RDX, AND TNT IN WASTEWATER Technical Progress Report, Oct. 1981 - Aug. 1982
Ernst E. Brueggemann Jan. 1983 22 p refs
(DA Proj. 3E1-62720-A-835)
(AD-A127348; USAMBRDL-TR-8206) Avail: NTIS HC A02/MF A01 CSCL 19/1

A method for the separation and detection of 1-acetyloctahydro-3,5,7-trinitro-1,3,5,7-tetrazocine (SEX), 1-acetylhexahydro-3,5-dinitro-1,3,5-triazine (TAX), 1,3,5,7-tetranitro-1,3,5,7-tetraazacyclooctane (HMX), 1,3,5-trinitro-1,3,5-triazacyclohexane (RDX), and 2,4,6-trinitrotoluene by high performance liquid chromatography (HPLC) is described. A RAD-PAK A C18 column was used. A water/methanol mobile phase employing a gradient elution was used. The detector was set at 240 nm. With HPLC the

separation of the different compounds was accomplished in 28 minutes. The detection limits were 0.2 ug/mL for SEX, HMX, TAX, RDX, and TNT. The method is simple, quick, and reproducible. Author (GRA)

N83-30672# Army Armament Research and Development Command, Dover, N. J. Large Caliber Weapon Systems Lab.
THE BURNING BEHAVIOR OF TNT IN THE CLOSED BOMB
Rodolf W. Velicky Mar. 1983 33 p refs
(DA Proj. 1L1-62603-AH-18)
(AD-A127279; AD-E400998; ARLCD-TR-83015) Avail: NTIS HC A03/MF A01 CSCL 19/1

The work shows that the physical structure of TNT breaks up during burning. Combustion proceeds on fragments with a new surface to volume ratio. The size, shape, and number of fragments is determined by the crystal pattern permitted to develop by the casting procedure. The intrinsic burning rate of TNT is very slow in relation to the rate of structural dissociation. Wax, the desensitizing agent used with TNT in the mixture Comp B, does not interact with TNT to modify its burning behavior. Author (GRA)

N83-30673# Army Aviation Engineering Flight Activity, Edwards AFB, Calif. Directorate for Development and Qualification.
FUEL CONSERVATION EVALUATION OF U.S. (UNITED STATES) ARMY HELICOPTERS. PART 4: OH-58C FLIGHT TESTING Final Report, 22 Sep. - 20 Nov. 1982
Daumants Belte and Michael V. Stratton Aug. 1982 82 p refs
(AD-A127422; USAAFEFA-81-01-4) Avail: NTIS HC A05/MF A01 CSCL 21/4

The United States Army Aviation Engineering Flight Activity conducted level flight performance tests of the OH-58C helicopter at Edwards AFB, California from 22 September to 20 November 1981, and at St. Paul, Minnesota, from 12 January to 9 February 1982. Nondimensional methods were used to identify effects of compressibility and blade stall on performance, and increased referred rotor speeds were used to supplement the range of currently available level flight data. Maximum differences in nondimensional power required attributed to compressibility effects varied from 6.5 to 11%. However, high actual rotor speed at a given condition can result in less power required than at low rotor speed even with the compressibility penalty. The power required characteristics determined by these tests can be combined with engine performance to determine the most fuel efficient operating conditions. GRA

N83-30674# Los Alamos Scientific Lab., N. Mex.
DEFLAGRATION-TO-DETONATION TRANSITION IN PETN AND HMX
Robert H. Dinegar Feb. 1983 10 p refs
(Contract W-7405-eng-36)
(DE83-009273; LA-9620) Avail: NTIS HC A02/MF A01

The deflagration-to-detonation transition (DDT) in both PETN and HMX is sensitive to the degree of subdivision and the compactness of the explosive in which the transition takes place. It apparently happens better with explosives of small specific surface loaded at low density. Experiment using thin metal shims between the donor and transition-explosive charges suggest that transition-explosive compression makes an important contribution to the DDT process. DOE

N83-30675# Tri-State Synfuels Co., Houston, Tex.
TRI-STATE SYNFUELS PROJECT REVIEW. VOLUME 8: COMMERCIAL STATUS OF LICENSED PROCESS UNITS
Jun. 1982 79 p
(Contract DE-FC05-81OR-20807)
(DE83-007434; DOE/OR-20807/T1-Vol-8) Avail: NTIS HC A05/MF A01

The commercial status of the process units to be used in the Tri-State Synfuels Project at Henderson, Kentucky was demonstrated. A configuration to produce gasoline via a methanol and methanol to gasoline process is discussed. To accomplish this change the synthol, oil workup and chemical workup units were eliminated and replaced by methanol synthesis and methanol to gasoline units. Certain other changes to optimize the Lurgi liquids processing eliminated the tar distillation and naphtha hydrotreater units which were replaced by the partial oxidation unit. The coals to be gasified are moderately caking which necessitates the installation of stirring mechanism in the Lurgi dry bottom gasifier. This work is in the demonstration phase. Process licenses either were obtained or must be obtained for a number of processes to be used in the plant. The commercial nature of these processes is discussed in detail. DOE

N83-30676# EMCON Associates, San Jose, Calif.
UTILIZATION OF LANDFILL GAS FOR VEHICLE FUEL SYSTEM, ROSSMAN'S LANDFILL, CLACKAMAS COUNTY, OREGON: FEASIBILITY STUDY
Feb. 1982 221 p refs Prepared in cooperation with Cal Recovery Systems, Inc., Richmond, Calif., and Gas Recovery Systems, Inc., Pasadena, Calif.
(Contract DE-FG01-80RA-50366)
(DE83-010622; DOE/RA-50366/1) Avail: NTIS HC A10/MF A01

The feasibility of utilizing landfill gas for fuel production was analyzed. The areas addressed include: landfill gas yield and collection, including an estimate of production rates, a prediction of methane yield versus time, and development of a conceptual gas gathering system; gas processing, compressing, and storage, including a review of current state of the art and relevant case histories, development of alternative processing options, selection of an optimum system, and conceptual design; and methane fueled vehicle systems, which includes a review of the state of the art and evaluation of case histories, development of alternative fuel systems, and final selection of the optimum system. Cost estimates and a summary of total project costs and economic feasibility are presented. DOE

N83-30677# Chem Systems, Inc., Tarrytown, N.Y.
LIQUID-PHASE-METHANOL PROCESS-DEVELOPMENT UNIT: INSTALLATION, OPERATION, AND SUPPORT STUDIES Technical Progress Report, 1 Oct. - 31 Dec. 1982
20 Jan. 1983 345 p refs Prepared in cooperation with Air Products and Chemicals, Inc., Allentown, Pa.
(Contract DE-AC22-81PC-30019)
(DE83-005491; DOE/PC-30019/T4; TPR-5) Avail: NTIS HC A15/MF A01

The technical feasibility of the liquid phase methanol (LPMeOH) process at the Process Development Unit scale of operation was demonstrated. Revision 2 of the LaPorte LPMeOH Process Development Unit Engineering Flowsheet was released, incorporating advances made in the engineering design. The Hazards Review team continued assessing risks associated with various process systems, particularly the reactor slurry loop. Process specifications were issued for an iron carbonyl removal system on the basis of a survey of industrial experience and literature related to the subject. The design for a flare system was developed. An outline of catalyst reduction procedures was prepared, and data was accumulated on properties of circulating oils and slurry. A literature search was completed for the major topics of interest to the program. Successful testing of in-situ catalyst reduction procedures continued in the Stirred Autoclave Reactors, and two additional commercial catalysts were screened. DOE

N83-30678# Deutsche Shell A.G., Hamburg (West Germany).
SHELL BRIEFING SERVICE: AIRCRAFT FUELS TODAY AND TOMORROW [SHELL BRIEFING SERVICE: FLUGKRAFTSTOFFE HEUTE UND MORGEN]
Nov. 1982 12 p refs In GERMAN
Avail: NTIS HC A02/MF A01

The worldwide increase of the demand for mineral oil products and the possible supply problem at the end of the eighties are reviewed. Author (ESA)

N83-30679# Massachusetts Inst. of Tech., Cambridge.
MIT-GRI LNB SAFETY AND RESEARCH WORKSHOP. VOLUME 1: RAPID-PHASE TRANSITIONS

Robert C. Reid Jul. 1982 209 p Workshop held in Cambridge, Mass., 22-24 Mar. 1982 Sponsored by Gas Research Inst., Chicago, Ill. 3 Vol.
(PB83-171462; GRI-82-0019.1) Avail: NTIS HC A10/MF A01 CSCL 21D

Safety issues dealing with rapidphase transitions (RPTs) are discussed. The RPT phenomenon is reviewed critically for cases of liquefied natural gas-water, molten smelt-water, and molten-metal explosions. GRA

N83-30680# Massachusetts Inst. of Tech., Cambridge. Dept. of Chemical Engineering.
MIT-GRI LNG SAFETY AND RESEARCH WORKSHOP. VOLUME 2: DISPERSION OF DENSE VAPORS
Jerry A. Havens (Arkansas Univ., Fayetteville) Jul. 1982 151 p refs Workshop held in Cambridge, Mass., 22-24 Mar. 1982 Sponsored by Gas Research Inst., Chicago, Ill. 3 Vol.
(PB83-171470; GRI-82-0019.1) Avail: NTIS HC A08/MF A01 CSCL 21D

Methods of prediction of dense vapor dispersion in the atmosphere are reviewed. Panel presentations describe recent large scale vapor dispersion tests conducted by Lawrence Livermore Laboratories for DOE and planned large scale testing sponsored by the British Health and Safety Executive. Uncertainties in vapor dispersion modeling methods and regulatory needs for heavy gas dispersion models are discussed. Supplemental comments are provided from panelists and from audience participation. Findings of the workshop are summarized and recommendations are made for future research. GRA

N83-30681# Technology and Management Systems, Inc., Burlington, Mass.
MIT-GRI LNG SAFETY AND RESEARCH WORKSHOP. VOLUME 3: LNG FIRES-COMBUSTION AND RADIATION
Phani K. Raj Jul. 1982 194 p refs Workshop held in Cambridge, Mass., 22-24 Mar. 1982 Sponsored by Gas Research Inst., Chicago, Ill. 3 Vol.
(PB83-171488; GRI-82-0019.3) Avail: NTIS HC A09/MF A01 CSCL 21D

Details of a comprehensive review of the state of the art knowledge on liquefied natural gas (LNG) fires and vapor combustion, the presentations by a 6 member panel, and the discussions between the audience and the panel on various issues concerning LNG fire and combustion problems are given. GRA

N83-30682# Battelle Pacific Northwest Labs., Richland, Wash.
KINETICS AND CATALYSIS OF PRODUCING SYNTHETIC GASES FROM BIOMASS Final Report, 7 Dec. 1979 - 6 Dec. 1982
L. J. Sealock, Jr., D. C. Elliott, and R. T. Hallen Dec. 1982 92 p refs
(GRI Proj. 0129)
(PB83-188664; GRI-82/0038) Avail: NTIS HC A05/MF A01 CSCL 21D

Basic research to provide a fundamental elucidation of the kinetics, reaction sequences and pathways involved in pyrolysis and catalytic steam gasification of wood and wood components is discussed. A detailed data base describing the steam gasification in the presence and absence of catalysts was investigated in both systems. This data base provides detailed information regarding gasification rates, char formation, degradation products, gas-phase reactions, reaction mechanisms and catalytic activity. Results demonstrated that the use of a properly selected catalyst or combined catalyst systems can significantly influence the gasification of biomass. GRA

N83-30683# Northwestern Univ., Evanston, Ill.
MECHANISTIC AND KINETIC STUDIES OF THE ELEMENTARY PROCESSES IN CATALYTIC COMBUSTION OF METHANE Annual Report, Sep. 1981 - Aug. 1982
Harold H. Kung and John B. Butt Oct. 1982 18 p Sponsored by Gas Research Inst.
(PB83-188615; GRI-81/0127) Avail: NTIS HC A02/MF A01 CSCL 21D

The progress towards determining the kinetics and the mechanism in the catalytic oxidation of methane by studying the reaction of some postulated intermediates on a well-characterized surface is discussed. Current emphasis is on the intermediate methylene radical. Preparation of the precursor for methylene, diazomethane is briefly described. An initial result suggested that diazomethane on adsorption on platinum decomposed readily to gaseous nitrogen and an adsorbed carbonaceous species. On heating methane and ethylene are the major products in the absence of oxygen. In contrast, adsorbed ethylene does not undergo reaction before desorption. This evidence suggests that the decomposed product is the desired methylene radical. GRA

N83-30809# Southwest Research Inst., San Antonio, Tex.
SCALING OF INITIATION OF EXPLOSIVES BY FRAGMENT IMPACT
W. E. Baker, M. G. Whitney, and V. B. Parr *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50, Part 4 Sep. 1980 p 199-212 refs (For primary document see N83-30794 19-31)
(Contract DACA87-79-C-0091)
Avail: NTIS HC A11/MF A01 CSCL 19/1

N83-30811# Sandia Labs., Albuquerque, N. Mex. Explosives Testing Div.
BREACHING OF STRUCTURAL STEEL PLATES USING EXPLOSIVE DISKS
D. L. Shirey *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50, Part 4 Sep. 1980 p 223-231 refs (For primary document see N83-30794 19-31)
Avail: NTIS HC A11/MF A01 CSCL 19/1

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N83-30684# Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION BULLETIN, NO. 52. PART 1: WELCOME, KEYNOTE ADDRESS, INVITED PAPERS, ROTOR DYNAMICS AND MACHINERY VIBRATION
May 1982 148 p refs The 52nd Symp. on Shock and Vibration, held at New Orleans, 26-28 Oct. 1981 5 Vol.
(Bull-52-Pt-1) Avail: NTIS HC A07/MF A01 CSCL 20/11

The measurement and dynamic analysis of the vibration of rotor systems and of other machine parts are discussed as well as techniques for determining the vulnerability of structures to the effects of nuclear and conventional weapons. For individual titles, see N83-30685 through N83-30691.

N83-30685*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
REQUIRED DEVELOPMENTS IN STRUCTURAL DYNAMICS c39
Ben K. Wada *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 1 May 1982 p 49-54 (For primary document see N83-30684 19-31)
Avail: NTIS HC A07/MF A01 CSCL 20K

The finite element method, modal component synthesis, and the use of fast Fourier transformation were key developments in structural dynamics in the past 15 to 20 years. Current areas requiring additional effort include: (1) the correct calculation of modal shape and natural frequencies for complex structures; (2) the correlation of math models with test data; (3) the establishment of a criteria for 'goodness' of the correlation between analysis and test; (4) the selection of the correct displacement functions when using computer programs for modal synthesis; (5) accuracy of response calculations; and (6) the inverse problem of determining the force problem from the response data. Trends identified include the use of distributed computing, greater reliance on analysis, and

the possible use of artificial intelligence techniques, or some way of feeding back information, to provide solution guidance to engineers. A.R.H.

N83-30686# Vibration Inst., Downers Grove, Ill.
MACHINERY VIBRATION EVALUATION TECHNIQUES c37
Ronald L. Eshleman *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 1 May 1982 p 67-79 refs (For primary document see N83-30684 19-31)
Avail: NTIS HC A07/MF A01 CSCL 13/9

Direct frequency analysis of vibration signals is commonly used to evaluate the condition of machinery. The variations of this technique and many other techniques available for machinery vibration evaluation are described including the time and frequency domains, orbital motions, transient tests, and parameter analyses - either calculated or measured. Author

N83-30687# Bently Nevada Corp., Minden.
SHAFT VIBRATION MEASUREMENT AND ANALYSIS TECHNIQUES c37
Donald E. Bently *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 1 May 1982 p 81-93 (For primary document see N83-30684 19-31)
Avail: NTIS HC A07/MF A01 CSCL 13/9

The use of electronic instrumentation for the measurement and analysis of rotating machinery has advanced greatly over the last fifteen years. Of the available vibration measurement transducers, the displacement proximity probe is most widely used on critical equipment. However, there are still some applications for the case-mounted transducers, velocity sensors, and accelerometers. For the purpose of machinery analysis, several hard copy data presentations are available. Data formats for steady-state machine conditions include oscilloscope time base waveforms and orbits and frequency spectra. For data from machines under transient conditions, the formats include Polar, Bode', cascade or waterfall plots, and change in average shaft centerline position. Author

N83-30688# Westinghouse Research and Development Center, Pittsburgh, Pa.
SPIN TEST VIBRATIONS OF PENDULOUSLY SUPPORTED DISC/CYLINDER ROTORS c37
F. H. Wolff and A. J. Molnar *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 1 May 1982 p 95-100 refs (For primary document see N83-30684 19-31)
Avail: NTIS HC A07/MF A01 CSCL 13/9

Forced vibration levels of disc and cylindrical shaped rotors as they are brought up to speed are calculated. The danger of spinning a pendulously supported rotor whose polar and diametral mass moments of inertia are nearly equal is analyzed and explained. Author

N83-30689# Franklin Research Center, Philadelphia, Pa.
MODAL ANALYSIS AS A TOOL IN THE EVALUATION OF A TURBINE WHEEL FAILURE c07
Anthony L. Moffa and Robert L. Leon *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 1 May 1982 p 101-123 refs (For primary document see N83-30684 19-31)
Avail: NTIS HC A07/MF A01 CSCL 21/5

Modal Analysis is a viable tool in the investigation of turbine wheel failures. With the advent of the portable dual channel analyzer, and impact excitation techniques, modal data can be accurately and easily taken right at the plant site. Armed with this additional information, a better estimate of the actual failure mode can be made. Following a turbine failure, the system is taken out of service, the failed parts are metallurgically analyzed, and the turbine is either repaired or replaced. It is during this time period that modal testing is performed and its evaluation used to aid in the failure analysis. S.L.

N83-30690# Institut National des Sciences Appliquees de Lyon, Villeurbanne (France). Lab. de Mecanique des Structures.
CONTRIBUTION TO THE DYNAMIC BEHAVIOUR OF FLEXIBLE MECHANISMS c39
E. Imam, J. derHagopian, and M. Lalanne *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 1 May 1982 p 125-133 refs (For primary document see N83-30684 19-31)
Avail: NTIS HC A07/MF A01 CSCL 20/11

In high speed rotating mechanisms links cannot be taken as perfectly rigid. General expressions for kinetic and strain energies of deformable plane rotating mechanisms are presented. The differential equations of the system are obtained using finite element techniques. The number of degrees of freedom of the system is reduced by a modal method and the solution of the system is obtained from a closed form algorithm taking into account the motion periodicity. A four bar system was tested. In order to reduce stresses and strains, damping was introduced by a viscoelastic sandwich treatment. The agreement between experimental and theoretical results is satisfactory for both the damped and undamped system. S.L.

N83-30691# Texas Technological Univ., Lubbock. Dept. of Mechanical Engineering.
SELF-EXCITED VIBRATION OF A NONLINEAR SYSTEM WITH RANDOM PARAMETERS c39
Raouf A. Ibrahim *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 1 May 1982 p 135-144 refs (For primary document see N83-30684 19-31)
Avail: NTIS HC A07/MF A01 CSCL 20/11

The dynamic behavior of a non-linear single degree of freedom system with negative linear damping and subjected to broad band random excitation is studied. The system response is analyzed by using two different approaches: the Stratonovich stochastic averaging method, and the Ito stochastic calculus together with the Gaussian closure. Closed form solutions of the stationary responses are obtained. It is shown that the two methods provide solutions which bifurcate from two different points for all the cases considered except at one point where the parametric excitations and the nonlinear restoring force are removed. It is concluded in this analysis that the Gaussian closure may be regarded as a linearization technique. The nontrivial stationary response suggests that the system can achieve a stable limit cycle provided a positive nonlinear damping is included. Unlike the Gaussian approximation, the influence of the nonlinear restoring force is not manifested in the averaging method results. S.L.

N83-30692# Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION BULLETIN, NO. 52. PART 2: INVITED PAPERS, SPACE SHUTTLE LOADS AND DYNAMICS, SPACE SHUTTLE DATA SYSTEMS, SHOCK TESTING, SHOCK ANALYSIS, SPACE SHUTTLE THERMAL PROTECTION SYSTEMS
May 1982 182 p refs The 52nd Symp. on Shock and Vibration, held at New Orleans, 26-28 Oct. 1981 5 Vol.
(Bull-52-Pt-2) Avail: NTIS HC A09/MF A01 CSCL 20/11

Topics concerning space shuttle loads and dynamics are addressed. In addition, special consideration is given to related shuttle data systems and the structural integrity of the thermal protection system. For individual titles, see N83-30693 through N83-30708.

N83-30693*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SPACE SHUTTLE MAIN ENGINE (SSME) POGO TESTING AND RESULTS c16
J. R. Fenwick (Rockwell International), J. H. Jones, and R. E. Jewell *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 1-20 refs (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 22B

To effectively assess the Pogo stability of the space shuttle vehicle, it was necessary to characterize the structural, propellant, and propulsion dynamics subsystems. Extensive analyses and

comprehensive testing programs were established early in the project as an implementation of management philosophy of Pogo prevention for space shuttle. The role of the space shuttle main engine (SSMF) in the Pogo prevention plans, the results obtained from engine ground testing with analysis, and measured data from STS-1 flight are discussed. Author

N83-30694*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SPACE SHUTTLE SOLID ROCKET BOOSTER WATER ENTRY CAVITY COLLAPSE LOADS c39
R. T. Keefe (Chrysler Corp.), E. A. Rawls (Chrysler Corp.), and D. A. Kross *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 21-26 refs (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 20K

Solid rocket booster cavity collapse flight measurements included external pressures on the motor case and aft skirt, internal motor case pressures, accelerometers located in the forward skirt, mid-body area, and aft skirt, as well as strain gages located on the skin of the motor case. This flight data yielded applied pressure longitudinal and circumferential distributions which compare well with model test predictions. The internal motor case ullage pressure, which is below atmospheric due to the rapid cooling of the hot internal gas, was more severe (lower) than anticipated due to the ullage gas being hotter than predicted. The structural dynamic response characteristics were as expected. Structural ring and wall damage are detailed and are considered to be attributable to the direct application of cavity collapse pressure combined with the structurally destabilizing, low internal motor case pressure. Author

N83-30695*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SPACE SHUTTLE SOLID ROCKET BOOSTER REENTRY AND DECELERATOR SYSTEM LOADS AND DYNAMICS c16
Richard Moog (Martin Marietta) and Dennis A. Kross *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 27-33 (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 22B

Recovery of the space shuttle solid rocket boosters required development of a heavy duty large decelerator subsystem. Successful recovery of the first launch pair of boosters demonstrated the adequacy of the design. Flight data consisting of accelerometers and parachute attach point loads provide a basis for evaluation of the decelerator subsystem performance. These results are summarized and compared to preflight predictions. Author

N83-30696# Thiokol Chemical Corp., Brigham City, Utah.
INVESTIGATION OF SIDE FORCE OSCILLATIONS DURING STATIC FIRING OF THE SPACE SHUTTLE SOLID ROCKET MOTOR c20
M. A. Behring *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 35-42 refs (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 21/8

Low frequency oscillations in measured side forces have occurred during static testing of the space shuttle solid rocket motor. An investigation was undertaken to define a forcing function to simulate the effect of these oscillations in vehicle loads studies. Data analyses and analytical studies conducted during this investigation are summarized. Author

N83-30697*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
DEVELOPMENT OF AN AUTOMATED PROCESSING AND SCREENING SYSTEM FOR THE SPACE SHUTTLE ORBITER FLIGHT TEST DATA c19
D. K. McCutchen, J. F. Brose (Lockheed Engineering and Management Services Co., Inc.), and W. E. Palm (McDonnell Douglas Corp.) *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 43-51 (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 14B

One nemesis of the structural dynamist is the tedious task of reviewing large quantities of data. This data, obtained from various types of instrumentation, may be represented by oscillogram records, root-mean-squared (rms) time histories, power spectral densities, shock spectra, 1/3 octave band analyses, and various statistical distributions. In an attempt to reduce the laborious task of manually reviewing all of the space shuttle orbiter wideband frequency-modulated (FM) analog data, an automated processing system was developed to perform the screening process based upon predefined or predicted threshold criteria. Author

N83-30698*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DEVELOPMENT OF A VIBROACOUSTIC DATA BASE MANAGEMENT AND PREDICTION SYSTEM FOR PAYLOADS c82
Frank J. On and William Hendricks (Lockheed Missiles and Space Co.) *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 53-64 refs (For primary document see N83-30692 19-31)
(Contract NAS5-25156)
Avail: NTIS HC A09/MF A01 CSCL 05B

A data base management and prediction system called vibroacoustic payload environment prediction system (VAPEPS) was developed to serve as a repository for shuttle or exendable booster payload component flight and ground test data. This system is to be made available to the aerospace community for multiple uses including that of establishing the vibroacoustic environment for new payload components. The VAPEPS data includes that spectral information normally processed from vibration and acoustic measurements (e.g., power spectra, sound pressure level spectra, etc.). Results of development to provide this capability by NASA Goddard Space Flight Center and Lockheed Missiles and Space Company are described. Author

N83-30699*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AUTOMATION OF VIBROACOUSTIC DATA BANK FOR RANDOM VIBRATION CRITERIA DEVELOPMENT c82
Robin C. Ferebee *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 65-70 refs (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 05B

A computerized data bank system was developed for utilization of large amounts of vibration and acoustic data to formulate component random vibration design and test criteria. This system consists of a computer, graphics tablet, and a dry-silver hard copier which are all desk-top type hardware and occupy minimal space. The data bank contains data from the Saturn V and Titan III flight and static test programs. The vibration and acoustic data are stored in the form of power spectral density and one-third octave band plots over the frequency range from 20 to 2000 Hz. The data was stored by digitizing each spectral plot by tracing with the graphics tablet. The digitized data was statistically analyzed and the resulting 97.5% probability levels were stored on tape along with the appropriate structural parameters. Standard extrapolation procedures were programmed for prediction of component random vibration test criteria for new launch vehicle and payload configurations. This automated vibroacoustic data bank system greatly enhances the speed and accuracy of formulating vibration test criteria. In the future, the data bank will be expanded to include all data acquired from the space shuttle flight test program. Author

N83-30700*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE DEVELOPMENT AND VERIFICATION OF SHUTTLE ORBITER RANDOM VIBRATION TEST REQUIREMENTS c16
M. C. Coody, H. K. Pratt (Rockwell International Corp.), and D. E. Newbrough (Management and Technical Services Corp.) *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52.

Part 2 May 1982 p 71-80 refs (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 22B

The unique space shuttle vehicle size, weight, and configuration gave rise to problems in determining vibration requirements and in verifying structural integrity for anticipated mission environments. The applications of large-scale vibration testing played a prominent part in qualifying the shuttle for its intended missions. Severe vibration excitation from rocket engines, aerodynamic noise, and onboard equipment are expected on each shuttle flight. Scale-model wind tunnel and rocket firing tests, as well as full-size rocket engine tests were relied on to define the random forcing functions. The determination of structural response to these environments is described as well as evaluations of measured flight data and comparison with predicted design and test criteria.
Author

N83-30701# Rockwell International Corp., Downey, Calif.
SPACE SHUTTLE ORBITER ACOUSTIC FATIGUE CERTIFICATION TESTING **c71**
R. A. Stevens *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 81-99 refs (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 20/1

The certification portion of the program supporting orbital flight tests, including test article selection, objectives, environments, results, and conclusions are discussed. Also included are comparisons of ground and flight test data. The Space Shuttle orbiter is designed to accommodate a unique combination of loads and environments not previously encountered inasmuch as the reusable vehicle is launched vertically and lands horizontally. The orbiter is subjected to structural vibration caused by engine exhaust-generated acoustic noise during liftoff and aerodynamic noise during atmospheric flight. It was necessary to certify the orbiter structure, thermal protection system, mechanisms, and equipment, and to gather empirical data to support fatigue analyses and to update vibration and internal noise criteria before the completion of the orbiter flight test program.
R.J.F.

N83-30702*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STRUCTURAL CHARACTERISTICS OF THE SHUTTLE ORBITER CERAMIC THERMAL PROTECTION SYSTEM **c27**
Paul A. Cooper *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 101-110 refs (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 11C

The thermal protection system (TPS) of the Space Shuttle Orbiter is described as well as the results of dynamic reponse studies conducted in support of the efforts to certify the TPS for flight. The ceramic Thermal Protection System consists of ceramic tiles bonded to felt pads which are in turn bonded to the Orbiter substructure to protect the aluminum substructure from the heat of reentry.
R.J.F.

N83-30703*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SHUTTLE TILE ENVIRONMENTS AND LOADS **c27**
Ralph J. Muraca *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 111-125 refs (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 11C

The Shuttle tile ascent environments are discussed and the procedures used to convert these environments into tile loads are outlined. Testing which was performed to quantify or verify the loads are discussed, along with the load combination rationale which was used. The discussion of the ascent environment is limited to the transonic/supersonic portion of the mission since mechanical design loads occur during this time, and to specific regions of the vehicle, in particular those regions in which undensified critical (black) tiles are located.
R.J.F.

N83-30704*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DYNAMIC AND STATIC MODELING OF THE SHUTTLE ORBITER'S THERMAL PROTECTION SYSTEM **c16**
J. M. Housner, G. L. Giles, and M. Vallas *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 127-145 refs (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 22B

The dynamic and static analysis methods used to model the nonlinear structural behavior of the Shuttle Orbiter's tile/pad thermal protection system are discussed. The structural evaluation of the tile/pad system is complicated by the nonlinear stiffening, hysteresis and viscosity exhibited by the pad material. Application of the analysis to square tiles subject to sinusoidal and random excitation is presented along with appropriate test data. Correlation is considered good. In order to treat the stress analysis of thousands of individual tiles, a nonlinear static analysis was developed which utilizes equivalent static loads derived from the dynamic environment. Tensile stress at the bondline is examined in thousands of unique tiles.
R.J.F.

N83-30705*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
BUFFET LOADS ON SHUTTLE THERMAL-PROTECTION-SYSTEM TILES **c16**
Charles F. Coe *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 147-153 (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 22B

Results of wind-tunnel and acoustic tests to investigate buffet loads on Shuttle Thermal-Protection-System (TPS) tiles are given. Also described is the application of these results to the prediction of tile buffet loads for the first shuttle flight into orbit. The wind-tunnel tests of tiles were conducted at transonic and supersonic Mach numbers simulating flow regions on the Orbiter where shock waves and boundary-layer separations occur. The acoustic tests were conducted in a progressive wave tube at an overall sound pressure level (OASPL) approximately equal to the maximum OASPL measured during the wind-tunnel tests in a region of flow separation. The STS-1 buffet load predictions yielded peak tile stresses due to buffeting that were as much as 20 percent of the total stress for the design-load case when a shock wave was on a tile.
R.J.F.

N83-30706*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
UNSTEADY ENVIRONMENTS AND RESPONSES OF THE SHUTTLE COMBINED LOADS ORBITER TEST **c16**
P. H. Schuetz (Rockwell International), L. D. Pinson, and H. T. Thornton, Jr. *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 157-163 refs (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 22B

Both separate and combined wind tunnel and vibration shaker tests were conducted on two structural panels representative of the Shuttle orbiter in the NASA LaRC 8-foot transonic pressure tunnel to determine the effects of combined loads on the thermal protection system (TPS). The primary objective of this test was to provide a combined full-scale load environment and realistic time history of the dynamic pressures, Mach numbers (through transonic), and dynamic structural responses of these panels. The panels were selected from orbiter locations where interactive load sources such as aerodynamic shock waves, turbulent boundary layers, strut-induced vorticity, and substrate deformation combined to provide high bonding loads between the TPS and the orbiter structure. The test panels were highly instrumented with static and dynamic pressure gages, accelerometers, deflectometers, strain gages, Schileren and high speed photography, and special instrumentation necessary to determine TPS/structure interface loads and tile motions. Two test specimens of each orbiter panel were utilized. Both were high-fidelity representations of the selected orbiter location.
R.J.F.

N83-30707# Rockwell International Corp., Canoga Park, Calif.
VIBRATION MATURITY OF THE SPACE SHUTTLE MAIN ENGINES **c20**
Edward W. Larson and Earl Mogil *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 165-176 (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 21/8

A review of the development of the Space Shuttle Main Engine zonal vibration criteria, laboratory vibration tests using zonal criteria to verify life of engine components, and the resolution of unexpected structural problems in turbine blades and in the main injector liquid oxygen post due to hot-gas flow is given. Hardware modifications were made to resist the dynamic loads associated with the vibration environments and the hot-gas flow phenomena until long lead time redesigns could be incorporated. The initial structural design of the Space Shuttle Main Engine was capable of withstanding all known shock and vibratory loads to be encountered during its useful life. However, during the development stage, some unexpected dynamic loads were uncovered that required redesign. The successful incorporation of the knowledge of shock and vibration loads gained during the development of these engines led directly to the first successful flight. R.J.F.

N83-30708# Rockwell International Corp., Canoga Park, Calif.
STRUCTURAL RESPONSE TO THE SSME FUEL FEEDLINE TO UNSTEADY SHOCK OSCILLATIONS **c20**
Edward W. Larson, Gary H. Ratekin, and George M. OConnor *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 177-182 refs (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 21/8

The Space Shuttle Main Engine (SSME) flight nozzle experiences unexpectedly large accelerations during engine start and cutoff transients. Two fuel feedline failures occurred during separate engine tests. To define the forcing function causing high nozzle accelerations, experimental air flow tests using a subscale model were performed with high-frequency pressure instrumentation such that pressure oscillation amplitude, frequency, and spacial characteristics could be determined. The test results led to the conclusion that the SSME was experiencing pressure oscillations at 38 psi at a frequency of approximately 100 Hz occurring over the last 3 feet of the nozzle. Results of this investigation yielded an understanding of the cause of the failures and led to a redesign that exceeds life requirements. Author

N83-30709# Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION BULLETIN, NO. 52. PART 3: ENVIRONMENTAL TESTING AND SIMULATION, FLIGHT ENVIRONMENTS
May 1982 263 p refs The 52nd Symp. on Shock and Vibration, held at New Orleans, 26-28 Oct. 1981 5 Vol.
(Bull-52-Pt-3) Avail: NTIS HC A12/MF A01 CSCL 20/11

Environmental testing and simulation, and flight environments are addressed. For individual titles, see N83-30710 through N83-30721.

N83-30710# Southwest Research Inst., San Antonio, Tex.
DIGITAL CONTROL OF A SHAKER TO A SPECIFIED SHOCK SPECTRUM **c35**
James F. Unruh *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 3 May 1982 p 1-9 refs (For primary document see N83-30709 19-31)
Avail: NTIS HC A12/MF A01 CSCL 14/2

A digital computer based control system was developed for a biaxial electrohydraulic shaker table used for seismic qualification testing of nuclear power plant components. The system drive signals were developed from a weighted linear sum of 1/6-octave psuedo random noise signals. Preliminary drive signal shaping is accomplished through the use of a series of table mounted dummy mass transfer functions obtained from a previously generated data bank. Ajustments to the drive signal are made by direct comparison of the resulting test response spectrum (TRS) to the required response spectrum (RRS). Drive signal shaping sequences for a 2000 lb electrical equipment control cabinet are presented to demonstrate the effectiveness of the control system for seismic qualification. Author

N83-30711# Dynamic Systems, Inc., McLean, Va.
MEASUREMENT OF ALL COMPONENTS OF STRAIN BY A 3-D FIBER OPTIC STRAIN GAGE **c35**
S. Edelman and C. M. Davis, Jr. *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 3 May 1982 p 19-24 refs (For primary document see N83-30709 19-31)
Avail: NTIS HC A12/MF A01 CSCL 14/2

An instrument which was designed, but not yet built is described. A three-dimensional strain gage imbedded in the Earth furnishes a complete description of the motions in the neighborhood of the gage. Fiber optic interferometers measure the three axial strains and the three shear strains at a point in terms of half-wavelengths of the laser light used. Arrays of such gages are suitable for geophysical exploration, earthquake studies, and studies of the effect of mechanical shocks on structures. The gage is sufficiently sensitive to monitor the motion of tectonic plates. Author

N83-30712# Army Engineer Waterways Experiment Station, Vicksburg, Miss.
REGISTRATION OF THREE SOIL STRESS GAGES AT 0 THROUGH 28 MPa (4000 psi) **c35**
Charles R. Welch *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 3 May 1982 p 25-30 refs Sponsored in part by Defense Nuclear Agency (For primary document see N83-30709 19-31)
Avail: NTIS HC A12/MF A01 CSCL 14/2

A series of static tests were conducted on three soil stress gages. The gages tested were the currently accepted SE soil stress gage (34 MPa (5000 psi) range), a modified high range SE (HRSE) soil stress gage (138 MPa (20,000 psi) range), and the Waterways Experiment Station Medium Level (WML) stress gage. The tests consisted of multiple static loadings of two different soil types (Reid-Bedford sand and buckshot clay) which contained four HRSE gages, four WML gages, and eight SE gages. The loading range was from 0 to 28 MPa (4000 psi). The test chamber was 1.17 m (46 in.) in diameter by 1.07 m (42 in.) deep. Representative outputs from all three gage types are presented. Of special concern are the recorded outputs from the standard SE gages. These measured the loading of both soil types reasonably well, but consistently over-registered during unloading in the sand. Hysteretic-type behavior was not observed on the other two types of gages. The results imply that for dynamic tests in some soils the standard SE gage will indicate higher impulses than had actually occurred. Author

N83-30713# General Dynamics/Convair, San Diego, Calif.
ANALYSIS AND TESTING OF A NONLINEAR MISSILE AND CANISTER SYSTEM **c15**
R. G. Benson, A. C. Deerhake, and G. C. McKinnis *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 3 May 1982 p 77-87 refs (For primary document see N83-30709 19-31)
Avail: NTIS HC A12/MF A01 CSCL 22/2

Analyses and tests were performed to evaluate the nonlinear vibration response of a missile in its protective canister. A diametric rattle space exists between the missile and the canister liner, an elastomer with load deflection properties that are approximately exponential. Simplified MSC/NASTRAN transient response analyses predict the response to be a series of repeated shocks with peak amplitudes that exceed some component allowables. A full-scale vibration test of this configuration showed that the predicted response character is correct but that the amplitude is conservative. Author

N83-30714# Birmingham Polytechnic, Perry Barr (England). Dept. of Mechanical and Production Engineering.
BIO-DYNAMIC RESPONSE OF HUMAN HEAD DURING WHOLE-

BODY VIBRATION CONDITIONS c52

B. K. N. Rao *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 3 May 1982 p 89-99 refs Sponsored in part by SERC (For primary document see N83-30709 19-31)

Avail: NTIS HC A12/MF A01 CSCL 06/16

Studies have shown that many commercial and military vehicles transmit high acceleration levels to the occupants in the frequency regions of 1 to 30 Hz, wherein lies the major body resonances. These bodily resonances influence the performance and psychology of drivers and passengers in various ways depending upon the magnitude of vibration input, posture, nature of task, attitude, etc. In the vehicle ride application area, it is now realized that the transmission of these vibrations to the head of occupants may significantly effect their dynamic visual acuity, resulting in "tunneling" and/or "blurring" of vision. Very few studies have been cited in the literature concerning the transmission of vibration from feet-to-head, or/and from seat-to-head. Owing to a limited number of subjects employed, limited postures, different facilities and experimental techniques, the results of these studies were interpreted in different ways. Also, most of the data refers to military personnel and its application to civilian population raises some doubts. Clearly, a need exists for accurate information on the head transmissibility characteristic of the human head, by exposing subjects from the civilian population to low frequency sinusoidal and random vibrations in the frequency range of 1 to 30 Hz. This paper covers the results obtained for various postures and different conditions. Author

N83-30715# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Flight Dynamics Lab.

YC-15 EXTERNALLY BLOWN FLAP NOISE c71

Lyle G. Peck *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 3 May 1982 p 101-113 refs (For primary document see N83-30709 19-31)

Avail: NTIS HC A12/MF A01 CSCL 20/1

The purpose of this project is to determine the acoustic environment on the wing/flap region of the McDonnell-Douglas YC-15 Short Takeoff and Landing cargo aircraft. The YC-15 is designed for augmented lift through the use of externally blown flaps deflecting the jet exhaust thereby turning the flow and increasing lift. This process creates an intense acoustic environment on the wing/flap region. Ten transducers on the right inboard wing/flap were selected for data analysis. Test conditions included takeoff, landing, taxi, cruise and ground static over the full range of operating conditions. Results of the test are in the form of narrowband and one-third octave plots, comparing the affects of engine pressure ratio, flap angle, microphone location, and forward speed on the acoustic environment in the wing/flap region. Author

N83-30716# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.

DETERMINATION OF THE DYNAMIC ENVIRONMENT OF THE F/FB-111 TAIL POD ASSEMBLY c05

Janice Chinn and Phyllis Bolds *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 3 May 1982 p 115-129 refs (For primary document see N83-30709 19-31)

Avail: NTIS HC A12/MF A01 CSCL 01/3

A comprehensive dynamic study was conducted on the F/FB-111 aircraft by Air Force Wright Aeronautical Laboratories. The vibration and acoustic data were needed to define the environment of the tail pod assembly in order to mount sensitive electronic equipments within. These data were compared with predicted F-111 Tail Warning Systems Specification ASD/ENAM-78-1 and Military Standard Environment Test Methods, 810-C. From the analysis of the data presented in this study, vibration data in the 300 to 500 Hz range exceeded the specification and does not allow a sufficient cushion for endurance testing for many of the transient conditions. Author

N83-30717# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.

AN ASSESSMENT OF THE A-10'S CAPABILITY TO OPERATE ON ROUGH SURFACES c05

Tony G. Gerardi and David L. Morris *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 3 May 1982 p 131-143 refs (For primary document see N83-30709 19-31)

Avail: NTIS HC A12/MF A01 CSCL 01/3

A study was conducted on the A-10's capability to operate on rough surfaces; specifically rapidly repaired bomb damage runways and taxiways. Emphasis was placed on a European combat configured takeoff gross weight of 40,755 pounds and a typical landing configuration weight of 30,300 pounds. Five types of bomb damage repairs were considered, specifically A through E category repairs. Results of the study indicate that the A-10 tends to respond to rough surfaces in its rigid body pitch mode thus making the nose landing gear (NLG) the critical component. An analytical study shows that by increasing the NLG strut precharge pressure from 179 psi to 250 psi, peak NLG loads are reduced y 20%. In addition, application of aft stick will unload the NLG and reduce NLG loads. Author

N83-30718# North Carolina State Univ., Raleigh. Dept. of Mechanical and Aerospace Engineering.

SUBCRITICAL FLUTTER TESTING USING THE FEEDBACK SYSTEM APPROACH c08

C. D. Turner *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 3 May 1982 p 145-157 refs (For primary document see N83-30709 19-31)

Avail: NTIS HC A12/MF A01 CSCL 01/3

Current experimental flutter data analysis techniques assume an open-loop system for the aerodynamic and structural model. Frequency, damping, and modal energy are obtained from the experimentally obtained open-loop transfer function. These quantities are used directly or with other analytical methods to predict the critical flutter speed, or for use in subcritical analytical/experimental data comparisons. History has shown that the various techniques and methods are not always reliable. This paper presents an additional technique that represents the aerodynamic and structural model as a closed-loop or feedback system. The feedback system approach is compatible with most current techniques, with the only additional data requirement being the zero air speed transfer function which is obtained during the ground vibration test. In using this approach, two additional parameters are obtained for use in the prediction of the critical flutter speed or for subcritical data comparison, these are the aerodynamic transfer function and the product of the aerodynamic transfer function with the zero air speed transfer function. The development of the feedback system approach and its application to a simple and complex model are presented. Author

N83-30719# General Dynamics/Convair, San Diego, Calif.

TOMAHAWK CRUISE MISSILE FLIGHT ENVIRONMENTAL MEASUREMENT PROGRAM c15

E. S. Rosenbaum and F. L. Gloyna *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 3 May 1982 p 159-228 refs (For primary document see N83-30709 19-31)

Avail: NTIS HC A12/MF A01 CSCL 22/2

Vibration measurements made during the Systems Integration and Design Validation Phases of the Tomahawk Cruise Missile Program are summarized. Data are also presented for the Ground Launched (GLCM), Sea Launched (SLCM) and Air Launched (ALCM) variants, in both power spectral density and shock spectra formats. Author

N83-30720*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

TEST PROGRAM TO DEVELOP VIBROACOUSTICS TEST CRITERIA FOR THE GALILEO BUS c71

D. L. Kern and C. D. Hayes *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 3 May 1982 p 229-247 (For primary document see N83-30709 19-31) (Contract NAS7-100)

Avail: NTIS HC A12/MF A01 CSCL 20A

In order to define random vibration test requirements for Galileo

bus-mounted hardware, an extensive vibroacoustics test program was conducted on hardware available from the previous Voyager spacecraft development program. The Galileo test program consisted of acoustic tests on three configurations of the Voyager Dynamic Test Model bus and shaker random vibration tests on two flight-like bus equipment bay assemblies and one dummy equipment bay assembly. The primary goal of the acoustic tests was to define vibration levels at locations on the bus structure representative of inputs to bus equipment bay assemblies and to obtain response data on bus bay subassemblies for correlation with the vibration tests response data. The primary purpose of the vibration tests was to determine if the vibration tests excited subassembly responses at least as severely as the bus acoustic tests. Author

N83-30721# Indian Space Research Organization, Trivandrum. Aerospace Structures Div.
SLV-3 FLIGHT VIBRATION ENVIRONMENT **c08**
S. A. Palaniswami, G. Muthuraman, and P. Balachandran *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 3 May 1982 p 249-263 refs (For primary document see N83-30709 19-31)
Avail: NTIS HC A12/MF A01 CSCL 01/3

The vibration test levels for SLV-3 were predicted based on empirical method. The second experimental flight of SLV-3 was instrumented at various locations to obtain actual vibration environment. The measurement scheme and data reduction are described. The various causes for the vibration are discussed in detail. The reduced levels from flight data are compared with predicted values. Author

N83-30722# Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION BULLETIN, NO. 52. PART 4: FATIGUE AND RANDOM LOADING CONTROL, ISOLATION AND DAMPING
May 1982 167 p refs The 52nd Symp. on Shock and Vibration, held at New Orleans, 26-28 Oct. 1981 5 Vol.
(Bull-52-Pt-4) Avail: NTIS HC A08/MF A01 CSCL 20/11

Several areas of shock and vibration are addressed including fatigue and random loading, control, isolation, damping, rotor dynamics, machinery vibration, space shuttle loads, engine dynamics and flight environments. For individual titles, see N83-30723 through N83-30739.

N83-30723# General Electric Co., Utica, N. Y. Aircraft Equipment Div.
FATIGUE LIFE PREDICTION FOR VARIOUS RANDOM STRESS PEAK DISTRIBUTIONS **c39**
Ronald G. Lambert *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 1-10 refs (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

Closed form analytical expressions were derived to predict the fatigue life for various random stress peak distributions. These distributions include the Rayleigh, exponential, truncated exponential, skewed Rayleigh, and finite sample size Rayleigh. Numerical examples of all expressions are worked out for a common structural aluminum alloy 7075-T6. The slopes of the resulting fatigue curves have application to accelerated random vibration test criteria.
Author

N83-30724# Waterloo Univ. (Ontario). Dept. of Civil Engineering.
FATIGUE LIFE EVALUATION, STOCHASTIC LOADING, AND MODIFIED LIFE CURVES **c39**
M. ElMenoufy, H. H. E. Leipholz, and T. H. Topper *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 11-19 refs Sponsored in part by National Research Council of Canada (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

Modified life curves were introduced to facilitate the fatigue life predictions with sufficient accuracy for a material (Van-80 steel) subjected to stochastic loading programs with a finite number of strain levels. The Monte Carlo techniques was used to reproduce the load programs, and a number of tests were performed. Also, for these tests, knowing the actual fatigue life, the probability distribution of the closed hysteresis loops over the entire history is then easilly obtained. For each test a straight line, tangent to the strain life curve or the Smith Parameter life curve, is constructed to satisfy Miner's theory. A family of lines is obtained, out of which an 'average' line was chosen for fatigue life predictions. If the usual life curves before modifications were used for fatigue life evaluation, they would have resulted in large nonconservative errors. The loading programs considered may not only in themselves have merit (as they may be appropriate models for practical situations of some significance) but that in addition they have great pedagogical value for any one concerned with the development of a sound theory of stochastic fatigue. Author

N83-30725# Hughes Aircraft Co., Culver City, Calif.
THE EFFECTS OF ENDURANCE LIMIT AND CREST FACTOR ON TIME TO FAILURE UNDER RANDOM LOADING **c39**
Allen J. Curtis and Sally M. Moite *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 21-31 refs (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

Customary calculations of time to failure under random loading were based on three concepts: (1) Miner's cumulative damage theory; (2) the loading is narrowband random giving complete stress reversals between successive extrema which are Rayleigh distributed; and (3) sigma-N curve may be defined by N sigma (sub b) = C. The increase in average time to failure which is expected due to: the absene of stresses in excess of + or - 3 sigma bar and the lack of fatigue damage for stress reversals less than the endurance limit. The increase due to the latter factor is given as a function of the ratio of the endurance limit, sigma (sub e prime) to the RMS stress, for three typical values of the slope, b, of the sigma-N curve. The increase in time is presented as the dimensionless ratio of the time without consideration of these effects to the time with them included. Author

N83-30726*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SINGLE POINT RANDOM MODAL TEST TECHNOLOGY APPLICATION TO FAILURE DETECTION **c16**
Walter M. West, Jr. *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 25-31 (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 22/2

Frequency response function data, normally acquired as a data base for use in development of empirically based mode shapes, has additional utility. Comparison and analysis of frequency response function data sets obtained prior to and after environmental tests of an Orbiter body flap have enabled identification of structural damage that was not detected by conventional visual, X-ray, and ultrasonic inspections. The analyses and conclusions reported demonstrate that specific damaged areas within a relatively complex structure identified on a timely basis. Author

N83-30727# Naval Surface Weapons Center, White Oak, Md.
FORCED VIBRATIONS OF A LARGE DAMPED MECHANICAL SYSTEM **c39**
David W. Nicholson *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 33-36 refs (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

A theorem of Strang was extended to derive a function whose extreme values give bounds on the forced response of a damped mechanical system. Here the derivation is briefly reviewed, the numerical algorithm for its computation is presented, and some computational for its computation is presented, and computational results are given which show the expected trend. Author

N83-30728# Morrow (Charles T.), Encinitas, Calif.
INDIRECT FOURIER TRANSFORM (IFT) AND SHOCK RESPONSE: A DETAILED PRESENTATION OF BASIC THEORY **c39**
Charles T. Morrow *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 37-45 refs (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

An algorithm is capable of yielding undamped residual shock spectra and indirect Fourier transforms, with minimal calculator or computer data memory requirements, and with about the same computation time as with the fast Fourier transform (FFT). For the same number of frequencies in the spectrum, computation is slower than with the FFT algorithm, but the latter fundamentally requires many more frequencies than are otherwise necessary for spectral analysis of shock. With minor alteration, the IFT algorithm can yield quite simply the instantaneous responses of undamped or damped linear and some nonlinear mechanical systems. A preliminary adaptation of this algorithm, for both spectral and response computation was demonstrated. The algorithm is presented here essentially as originally developed for the HP-97 card programmable calculator, whose memory limitations are more obvious. Author

N83-30729# State Univ. of New York at Buffalo, Amherst. Dept. of Civil Engineering.
ACTIVE VIBRATION CONTROL OF LARGE FLEXIBLE STRUCTURES
T. T. Soong and J. C. H. Chang *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 47-54 refs (For primary document see N83-30722 19-31)
(Grant NSF CEE-80-10891)
Avail: NTIS HC A08/MF A01 CSCL 20/11

Active vibration control of large and complex structures is described. An important problem of actively controlling large flexible structures is one of compensating for control and observation spillover when a large dimensional system must be controlled by a much smaller dimensional controller. A modal control design procedure is developed which not only insures that the controlled structural modes stay close to the designed values but also preserves stability in the uncontrolled modes. The sensitivity of spillover compensation to the placement of controllers and sensors is also studied. Author

N83-30730# Army Armament Research and Development Command, Dover, N. J.
FORCE OPTIMIZED RECOIL CONTROL SYSTEM **c15**
Philip E. Townsend, Robert J. Radkiewicz, and Robert F. Gartner (Honeywell, Inc.) *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 55-71 (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 16/4

Reduction of the recoil force of high rate of fire automatic guns was proven effective. This system will allow consideration of more powerful guns for use in both helicopter and armored personnel carrier applications. By substituting the large shock loads of firing guns with a nearly constant force, both vibration and fatigue problems that prevent mounting of powerful automatic guns is eliminated. Author

N83-30731# Martin Marietta Corp., Denver, Colo.
PERFORMANCE ANALYSIS OF HIGH-SPEED HYDRAULIC SUSPENSION SYSTEMS IN MULTIPLE WHEELED LAND TRANSPORTERS **c85**
Phineas Woods *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 73-85 refs (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 13/6

Fluid/structure interaction is developed for a hydraulic suspension system. Finite element models of the fluid are developed in a manner identical to structural elements. After imposing continuity, the fluid system is coupled to the structural system by Rayleigh-Ritz assumed modes which satisfy boundary conditions. Damping in the combined system is built up from discrete constant coefficients for the tires, from laminar flow resistance in the fluid and from modal damping assumed for the structure. Input disturbances at the roadway surface are expressed as functions of time or random acceleration spectra. Response of the transporter system is expressed in time or frequency domains. Good agreement is obtained with a limited amount of test data. Author

N83-30732# Concordia Univ., Montreal (Quebec).
NONLINEAR ANALYSIS OF PNEUMATIC GENERATORS USED FOR VIBRATION CONTROL **c39**
S. Sankar, R. R. Guntur (Union Coll.), and S. G. Kalambur (Electronics Associates Inc.) *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 87-101 refs Sponsored in part by Natural Science and Engineering Council of Canada (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

Pneumatic isolators using passive and active force generators were developed. Realistic digital simulation programmes through nonlinear analysis for investigating the tramsmissibility characteristics of active and passive pneumatic systems. It is shown that active system offers greater flexibility to the designer than the passive system. Guide lines for selecting various feedback gains are presented. E.A.K.

N83-30733# Grumman Aerospace Corp., Bethpage, N.Y.
REDUCTION OF HYDRAULIC LINE OSCILLATING PRESSURES INDUCED BY PUMP CAVITATION **c34**
George Druhak, Paul Marino, and Murray Bernstein *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 103-121 refs (For primary document see N83-30722 19-31)
(Contract N00019-77-A-0202)
Avail: NTIS HC A08/MF A01 CSCL 20/4

A Helmholtz resonator cavitation attenuator to reduce oscillating pressure and resulting vibration induced stresses was developed. Its development, the magnitude of reduction it effected in hydraulic line and bracket stresses, and the analytic procedure to calculate the standing pressure wave induced stresses in hydraulic lines are described. E.A.K.

N83-30734# Martin Marietta Aerospace, Orlando, Fla.
RUBBER ISOLATORS FOR THE ADATS MISSILE **c39**
Jean-Pierre Frottier (Oerlikon-Buehrle Werkzeugmaschinenfabrik) and Clifford S. OHearne *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 1-10 ref (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 16/4

The present case is exceptional: A missile fintip mounted photodetector which receives uplink information on a laser beam carrier is suspended on a 1000 Hz isolation system. The isolating of the detector decreases microphonic noise in its output signal. In the development of this system, a piezoelectric shaker operating to 20 KHz meaasured the isolation. It is found that the ramburner firing produces an acoustical source similar to the ADATS rocket motor plume. E.A.K.

N83-30735# Naval Sea Systems Command, Washington, D. C.
TIME AND TEMPERATURE EFFECTS ON CUSHIONS **c39**
Gordon S. Mustin *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 131-140 refs (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

Dynamic behavior of cushions can be modeled by exponential equations describing the time and temperature dependent loci of the nadirs of logarithmic parabolas in the acceleration static stress plane and of the lengths of the latus recta of these parabolas. A set of nine empirical constants describe this dynamic behavior over a wide range of drop heights and thicknesses at temperatures ranging from slightly above the glass temperature of the polymer to 344 K. E.A.K.

N83-30736# Queensland Univ., St. Lucia (Australia). Dept. of Mechanical Engineering.
EXTRANEOUS EFFECTS IN DAMPING MEASUREMENT c39
Robert J. Hooker and S. Prasertsan (Prince of Songkla Univ.) *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 1-10 refs (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

The assumption that extraneous effects may be ignored on the basis of tests with a low damping specimen for some material damping measurements is not necessarily valid is shown. Analytical and experimental investigations for a common torsional damping apparatus arrangement in which load is applied to the specimen through end shanks are reported. Much greater errors associated with end effects than are expected from analytical considerations are indicated. E.A.K.

N83-30737# Chinese Academy of Sciences, Peking. Inst. of Mechanics.
DYNAMIC ANALYSIS OF A LARGE STRUCTURE WITH ARTIFICIAL DAMPING c39
Q. L. Tian, D. K. Liu, Y. P. Li, and D. F. Wang *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 147-153 refs (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

A complex modal synthesis method to analyze the dynamic response of a large structure with artificial damping is presented. The whole structure is disintegrated into several substructures, then the complex redundant force vector is applied to represent the reaction between the interfaces of substructures, the reaction between the absorbers and the substructures. The locally modified stiffness matrix is applied to represent the local constrained layer damping treatment. The motion equation of the assembled structure is deduced by the fixed interface mode synthesis method is obtained. The size of this new matrix is small enough to be solved by a complex eigenvalue program with low cost. The transfer function of the assembled system was calculated by the complex modal superposition method, so that the dynamic response could be calculated when the structure is subjected to a forced vibration. E.A.K.

N83-30738# Chinese Academy of Sciences, Peking. Inst. of Mechanics.
AN EXPERIMENTAL STUDY OF THE NON-LINEAR BEHAVIOUR OF A STRANDED CABLE AND DRY FRICTION DAMPER c39
C. S. Chang and Qianli L. Tian *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 155-160 refs (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

The nonlinear characteristics of a stranded cable and dry friction damper are shown by its hysteresis loop and dynamic response curves. It is found that the fundamental resonant frequency is amplitude dependent. The damper with a standard stranded cable has a high amplification factor at large amplitudes of vibration. This undesirable characteristic is overcome by adding a spring coil to the central portion of the cable. It is shown that modified cable damper suppresses the fundamental resonant vibration of a cantilever structure. E.A.K.

N83-30739# Vermont Univ., Burlington. Dept. of Mechanical Engineering.
RESPONSE OF PNEUMATIC ISOLATOR TO STANDARD PULSE SHAPES c34
M. S. Hundal *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 161-168 refs (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/4

Operation of a symmetric passive pneumatic shock isolator is analyzed. The equations are put in dimensionless form and solved numerically. Dimensionless parameters representing mass, stiffness and orifice/piston area ratio were studied. It is found that on the basis of a sustained acceleration input the system has optimum response for a certain range of the area ratio. System response is determined for six pulse shapes: rectangular, half sine, versed sine, rising saw tooth, falling saw tooth and triangle. E.A.K.

N83-30740# Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION BULLETIN, NO. 52. PART 5: MATHEMATICAL MODELING AND STRUCTURAL DYNAMICS
May 1982 156 p refs The 52nd Symp. on Shock anJ Vibration, held at New Orleans, 26-28 Oct. 1981 5 Vol.
(Bull-52-Pt-5) Avail: NTIS HC A08/MF A01 CSCL 20/11

The use of finite elements in designing damped structures and in modeling dynamics in initial boundary value problems are discussed. Soil-structure interaction, and the dynamic characteristics and damping of pinned columns, laminated composite plates, hull structures, spherical shells, and shallow-buried structures are considered. For individual titles, see N83-30741 through N83-30751.

N83-30741# Dayton Univ., Ohio.
DAMPED STRUCTURE DESIGN USING FINITE ELEMENT ANALYSIS c39
Matthew F. Kluesener and Michael L. Drake *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52, Part 5 May 1982 p 1-12 refs (For primary document see N83-30740 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

The performance requirements and the life cycle costs for jet engines and aircraft increase the need for functional high cycle fatigue (HCF) control. The methodology of using finite element analysis to evaluate viscoelastic damping treatments for HCF control is presented. Steps for analyzing passive damping treatments are examined. Design criteria used to evaluate the damping applications, as well as two methods of calculating the structural loss factor are discussed. The results from analyses of a stiffened panel and turbine blade are included. Author

N83-30742*# Old Dominion Univ., Norfolk, Va. Dept. of Mechanical Engineering and Mechanics.
DETERMINATION OF NORMAL MODES FROM MEASURED COMPLEX MODES c39
S. R. Ibrahim *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 5 May 1982 p 13-17 refs Sponsored in part by NASA. Langley Research Center (For primary document see N83-30740 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20K

A technique is presented for computing a set of normal modes from a set of measured complex modes. The number of elements in the modal vectors, which is equal to the number of measurements, can be larger than the number of modes under consideration. It is also shown that the practice of normal mode approximation to complex modes can lead to very large errors when the modes are too complex. A numerical example and a simulated experiment illustrate the concepts discussed and support the theory presented. Author

N83-30743# Minnesota Univ., Minneapolis. Dept. of Mechanical Engineering.
THE EFFECT OF JOINT PROPERTIES ON THE VIBRATION OF TIMOSHENKO FRAMES c39
I. Yaghmai (Sharif Univ. of Technology) and D. A. Frohrib *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 5 May 1982 p 19-27 refs (For primary document see N83-30740 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

Mechanical support fixtures comprised of short beams and joints have natural frequencies which may differ appreciably from predictions based on slender beam theory and which neglect joint properties. The role of Timoshenko effects and joining properties on the first several natural frequencies of frame structures is discussed. The interaction between these properties and the number of vertical bays of the structure is also portrayed. Author

N83-30744# Naval Civil Engineering Lab., Port Hueneme, Calif.
SOIL STRUCTURE INTERACTION AND SOIL MODELS
John M. Ferritto *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 5 May 1982 p 29-38 refs (For primary document see N83-30740 19-31)
Avail: NTIS HC A08/MF A01 CSCL 08/13

Soil-structure interaction effects can significantly alter the computed seismic behavior of a structure. The accurate characterization of the nonlinear soil behavior is important in considering seismic amplification and attenuation. Soil models, fitting of parameters, and comparison of results are discussed. Linear and nonlinear example data are compared. Author

N83-30745# Army Armament Research and Development Command, Watervliet, N. Y. Large Caliber Weapon Systems Lab.
FINITE ELEMENTS FOR INITIAL VALUE PROBLEMS IN DYNAMICS c39
T. E. Simkins *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 5 May 1982 p 39-47 refs (For primary document see N83-30740 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

The complete dynamic analysis of shock and vibration problems usually requires the solution of one or more hyperbolic partial differential equations involving space and time as independent variables. Many times a numerical solution is attempted by first eliminating the spatial dependency through the substitution of Ritz type approximations into a variational formulation of the problem, thus generating a corresponding set of ordinary differential equations in time, i.e., the Euler-Lagrange equations for the problem. When true shock conditions are encountered, there may result no solution at all. For such problems advantage may be gained by continuing the variational formulation into the time domain, dispensing altogether with the Euler-Lagrange equations and the need to solve them. The Hamilton law of varying action, a constrained variational principle, global and perceived Ritz approximation, and the anomalous behavior of finite element formulations for the time domain are examined. The utility of finite elements in time is also demonstrated. A.R.H.

N83-30746# State Univ. of New York, Buffalo. Dept. of Mechanical and Aerospace Engineering.
A PROCEDURE FOR DESIGNING OVERDAMPED LUMPED PARAMETER SYSTEMS c39
Daniel J. Inman and Albert N. Andry, Jr. (Lockheed-California Co.) *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 5 May 1982 p 49-53 refs (For primary document see N83-30740 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

The concept of overdamping common to a single degree of freedom damped linear system is extended to multidegree of freedom damped linear systems. Inequalities involving the mass, damping and stiffness parameters are derived to form a system with a free response which is overdamped in each mode. A general method for designing systems to be overdamped in each mode is indicated. The method is applied to a four degree of freedom model of a Darrieus wind turbine and a design solution for overdamping is presented. Author

N83-30747# Virginia Univ., Charlottesville.
ON THE OPTIMAL LOCATION OF VIBRATION SUPPORTS c39
B. P. Wang and W. D. Pilkey *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 5 May 1982 p 55-58 refs (For primary document see N83-30740 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

The problem of optimal positioning of vibration supports to raise the fundamental natural frequency of a system is studied. It is proposed that possible locations of the supports can be compared by studying the corresponding antiresonant frequencies. It is contended that a near optimal location is achieved by locating the supports such that the corresponding lowest antiresonant frequency is a maximum and a criterion is proposed. Numerical examples are used to illustrate this criterion. Author

N83-30748# Naval Ship Research and Development Center, Bethesda, Md.
DYNAMIC BUCKLING OF PINNED COLUMNS c39
J. M. Ready *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 5 May 1982 p 59-98 refs (For primary document see N83-30740 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

A series of dynamic tests was conducted on parametrically varied pinned columns in order to develop design guidance for foundations of shipboard equipment. Tests show that incipient buckling can occur at loads as low as 70 percent of the Euler buckling load. Applied dynamic loads of 50 percent of the Euler load do not appear to cause buckling when eccentricity is low. The tests also show that columns can carry loads that are multiples of the Euler load provided the load duration is short compared to the fundamental bending period of the columns; otherwise the columns collapse. Columns subjected to dynamic compressive loads equal to the Euler load and of a duration equal to the period of the column are in imminent danger of collapse. Author

N83-30749# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
LARGE DEFLECTION RANDOM RESPONSE OF SYMMETRIC LAMINATED COMPOSITE PLATES c24
K. R. Wentz, D. B. Paul, and C. Mei (Old Dominion Univ.) *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 5 May 1982 p 99-111 refs (For primary document see N83-30740 19-31)
Avail: NTIS HC A08/MF A01 CSCL 11/4

Large amplitude response of symmetric laminated rectangular plates subjected to broadband random acoustic excitation is studied analytically. The boundary conditions considered are all the edges simply supported and all the edges clamped. The inplane edge conditions considered are immovable and movable for each of the above cases. Mean-square deflections, mean-square strains, and equivalent linear frequencies at various acoustic loadings are obtained for [+ or - 45](s) and [0, + or - 45, 90](s) graphite-epoxy laminates. The analytical results are verified through comparison with experimental data. The results obtained can be used in the sonic fatigue design of composite aircraft panels. Author

N83-30750# Naval Ocean Systems Center, San Diego, Calif.
VIBRATION AND ACOUSTIC RADIATION FROM POINT EXCITED SPHERICAL SHELLS c71
Edmond H. Wong and Sabih I. Hayek (Pennsylvania State Univ.) *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 5 May 1982 p 135-154 refs (For primary document see N83-30740 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/1

Two thin aluminum spherical shells were excited by an impedance head at the apex, simulating a mechanical point excitation. The driving point admittance frequency spectra of the shells when excited in air were recorded and at each maximum, the mode shape at resonance was plotted. These measurements were repeated when the shell was suspended in a large water tank. The driving point admittance of the submerged shells was recorded. The mode shapes at resonance were plotted by use of a small hydrophone that measured the nearfield pressure of the vibrating shells. A parallel analytic prediction of the amplitude of the vibration, the nearfield and farfield pressures were made. A thin shell theory with bending terms was adapted for the equations of motion. For vibration in air or in vacuo, the solution was obtained by the normal mode approach. The predicted resonances were compared to the measured ones and found to agree within 5 percent for mode orders up to 32. An iterative technique was used to calculate the resonances of the submerged shells in water. The predicted resonances agreed within 6 percent with the measurements. Skudrzyk's mean-line theorem was used to predict the mean-line of the driving point admittance. Author

N83-30751# Weidlinger Associates, Menlo Park, Calif.
DAMPING OF SHALLOW-BURIED STRUCTURES DUE TO SOIL-STRUCTURE INTERACTION c39

Felix S. Wong and Paul Weidlinger *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 5 May 1982 p 149-154 refs (For primary document see N83-30740 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

Damping of the motion of buried structures is derived based on the mechanics of dynamic soil-structure interaction. The interplay between the structural motion and the soil loading on the structure results directly in the damping of the structural motion. The derivation is illustrated by an example of a horizontal slab embedded in an elastic soil medium. Author

N83-30752# Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION BULLETIN, NO. 50. PART 1: WELCOME, KEYNOTE ADDRESS, INVITED PAPERS
Sep. 1980 54 p refs The 50th Symp. on Shock and Vibration, held at Colorado Springs, 16-18 Oct. 1979 4 Vol.
(Bull-50-Pt-1) Avail: NTIS HC A04/MF A01 CSCL 20/11

Measurement in perspective dynamic analysis and design challenge for the future, materials in dynamics and dynamic testing are discussed. For individual titles, see N83-30753 through N83-30756. Author

N83-30753# Washington Univ., St. Louis, Mo.
MEASUREMENT IN PERSPECTIVE **c35**
Robert M. Mains *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Pt. 1 Sep. 1980 p 15-16 refs (For primary document see N83-30752 19-31)
Avail: NTIS HC A04/MF A01 CSCL 14/2

A survey of accurate, scientific measurement is presented. Author

N83-30754# Boeing Aerospace Co., Seattle, Wash.
DYNAMIC ANALYSIS AND DESIGN: CHALLENGE FOR THE FUTURE **c39**
Robert W. Hager *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Pt. 1 Sep. 1980 p 17-25 (For primary document see N83-30752 19-31)
Avail: NTIS HC A04/MF A01 CSCL 20/11

The need for high confidence, cost-effective, rapid dynamic analysis and design is addressed. Author

N83-30755# Army Materials and Mechanics Research Center, Watertown, Mass.
SHOCK IN SOLIDS: ARMY MATERIALS RESEARCH AND APPLICATIONS **c39**
R. Shea and J. F. Mescall *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Pt. 1 Sep. 1980 p 27-38 refs (For primary document see N83-30752 19-31)
Avail: NTIS HC A04/MF A01 CSCL 20/11

The US Army Materials and Mechanics Research Center (AMMRC) research program in shock in solids is discussed. The AMMRC mission and technology base program is described, with emphasis on solid mechanics. Author

N83-30756# Hughes Aircraft Co., Culver City, Calif.
DYNAMIC TESTING: HOW FAR WE'VE COME; HOW MUCH FURTHER TO GO **c39**
Allen J. Curtis *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Pt. 1 Sep. 1980 p 39-44 (For primary document see N83-30752 19-31)
Avail: NTIS HC A04/MF A01 CSCL 20/11

The evolution of vibration testing, the test purpose matrix, the test condition matrix and screening vibration requirements are discussed. Author

N83-30757# Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION BULLETIN, NO. 50. PART 2: MEASUREMENT TECHNIQUES AND DATA ANALYSIS, DYNAMIC MEASUREMENTS, VIBRATION AND ACOUSTICS
Sep. 1980 251 p refs The 50th Symp. on Shock and Vibration, held at Colorado Springs, 16-18 Oct. 1979 4 Vol.
(Bull-50-Pt-2) Avail: NTIS HC A12/MF A01 CSCL 20/11

Topics concerning measurement techniques and data analysis, dynamic measurements, and vibration and acoustics are covered. For individual titles, see N83-30758 through N83-30777.

N83-30758# Systron Donner Corp., Concord, Calif.
A PRECISION INERTIAL ANGULAR VIBRATION MEASURING SYSTEM **c35**
H. D. Morris, R. B. Peters, and P. H. Merritt (AFWL) *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Part 2 Sep. 1980 p 1-10 refs (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 14/2

An instrumentation system is described which permits high precision broadband angular vibration measurements or real time image motion compensation in typical aircraft environments. The system consists of a proprietary dynamic inertial angular displacement sensor calibrated by a special purpose table which is capable of producing and measuring sinusoidal motions up to one milliradian peak amplitude from 1 Hz to over 500 Hz. For a typical flight application, system accuracy is estimated as 0.3 arc seconds, 1 sigma for data in the optimum 70 Hz to 500 Hz band, and 1.4 arc seconds from 1 Hz to 1500 Hz. These estimates include environmental effects. Actual flight data is presented which verifies the estimated accuracy. M.G.

N83-30759# New Mexico State Univ., Las Cruces. Physical Science Lab.
ANGULAR ACCELERATION MEASUREMENT ERRORS INDUCED BY LINEAR ACCELEROMETER CROSS-AXIS COUPLING **c52**
Anthony S. Hu *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Part 2 Sep. 1980 p 11-16 refs 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 06B

In biomechanical experiments, the head angular impact responses of the test subject are usually calculated from the data of linear accelerometers because of their small size and light weight. As many as nine linear accelerometers are sometimes used for a complete three dimensional head kinematic measurement. One major error source of this type of measurement is the cross-axis coupling of the accelerometers. The mathematical model of the instrument, the cross-axis sensitivity, the angular measurement errors caused by the linear accelerometers, and the physical meaning of each error term under various impact motions are discussed. Insight into the limitations of the measurement technique are revealed. M.G.

N83-30760# Westinghouse-Bettis Atomic Power Lab., Pittsburgh, Pa.
A METHOD FOR EXPERIMENTALLY DETERMINING ROTATIONAL MOBILITIES OF STRUCTURES **c39**
Stanley S. Sattinger *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Part 2 Sep. 1980 p 17-28 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 20/11

It is shown that rotational mobilities of structures are equivalent to spatial derivatives of their translational mobilities. The method of finite differences is adapted to the approximation of these derivatives. By this method the rotational mobilities are derived from sets of conventionally measured translational mobilities, eliminating the need for special fixturing. This approach to determining rotational mobilities is demonstrated in a set of experiments on a free-free beam. Good agreement is obtained between experimentally and theoretically generated versions of two rotational velocity/force mobilities. An experimentally derived rotational velocity/moment mobility is found to give reasonably good indications of resonances but exhibits large amounts of scatter in some frequency bands. This scatter is attributed to the subtraction of translational mobility quantities which are nearly equal in magnitude. Further investigation is needed to determine an effective method of smoothing the translational mobility data before the differencing calculations to eliminate this scatter. M.G.

N83-30761# Naval Underwater Systems Center, New London, Conn.
TRANSIENT EFFECTS IN ACOUSTIC SOUND REDUCTION MEASUREMENTS **c71**
A. J. Kalinowski *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Part 2 Sep. 1980 p 29-44 refs 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 20/1

Experimental problems associated with the measurement of transmitted and/or reflected sound for test panels coated with a homogeneous viscoelastic layer are treated through the application of analytical techniques. The goal of the experimentalist is to measure the steady state transmitted and/or reflected sound pressure for a coated, submerged flat plate, subject to a train of normally incident harmonic waves. Specifically, the questions addressed are: (1) what is the minimum number of incident wave cycles required to reach steady state, (2) what is the minimum number of cycles required for the transmitted or reflected response to reach steady state and (3) how far can the peak transient response deviate from the steady state response if minimum acceptable input and output pulse lengths defined by (1) and (2) are not met. M.G.

N83-30762# California Univ., Livermore. Lawrence Livermore Lab.
AUTOMATIC DATA CHANNEL CALIBRATION AND NOISE IDENTIFICATION **c35**
Edwin E. Nesbit *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Part 2 Sep. 1980 p 57-72 refs 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 14/2

As part of an overall upgrade of dynamic testing facilities, an automatic data channel calibration system was implemented that uses microcomputer-based hardware and a parameter identification algorithm derived from optimal control theory. Analyses are performed using sine and square wave calibration signals (at user-specified frequencies) to determine channel gain and offset, and known constant calibration signals to determine 60, 120, and 180 Hertz channel noise. Author

N83-30763# GARD, Inc., Niles, Ill.
DYNAMIC MEASUREMENTS. AN ASSESSMENT OF THE COMMON CARRIER SHIPPING ENVIRONMENT **c37**
Fred E. Ostrem *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Part 2 Sep. 1980 p 83-90 refs 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 13I

An assessment of available data and information describing the common carrier shipping environment is presented. The assessment includes the mechanical shipping hazards of shock and vibration associated with the handling and transportation of typical distribution cycles. Data for these hazards are summarized in a format considered most useful to packaging engineers. Application of the data to support an ASTM Proposed Recommended Practice for Performance Testing of Shipping Container is described. Author

N83-30764# Department of Agriculture, Beltsville, Md. Transportation and Packaging Research Branch.
SHOCK AND VIBRATION ENVIRONMENT IN A LIVESTOCK TRAILER **c39**
M. T. Turczyn, D. G. Stevens, and T. H. Camp *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Part 2 Sep. 1980 p 91-101 refs 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 20/11

Measurements indicate that the intensity of the shock and vibrational inputs to cattle being transported by livestock trailer are dependent upon tire pressure, load weight, and position within the trailer. Cattle positioned at the rear of the trailer will experience the highest shock and vibrational amplitudes. At this position, as in all locations, under fully loaded conditions the vertical axis usually dominated. Cattle experience simultaneous vibrational energy inputs having peaks at 4 to 6 Hz, 15 Hz, and 30 Hz with magnitudes up to 0.08 g rms in the vertical axis and substantially lower in the lateral and logitudinal axes. Cattle experience simultaneous shock energy inputs having frequency components below 20 Hz which have acceleration values up to 6 g in the vertical axis, and up to 3 g in the longitudinal and lateral axes. The frequency content and amplitude levels of these vibrational and shock inputs may stress the animals enough to enhance their susceptibility to disease. Author

N83-30765# Pacific Missile Test Center, Point Mugu, Calif.
SHOCK INDUCED IN MISSILES DURING TRUCK TRANSPORT **c39**
D. B. Meeker and J. A. Sears *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Part 2 Sep. 1980 p 103-120 refs 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 20/11

The response of three different types of missiles during four truck trips was measured using an Endevco TEMARS (transportation environment measurement and recording system). The shock response peaks were found to have an exponential distribution in amplitude. The spectrum of the shocks was defined in terms of the level which is exceeded at a given rate. Formulae are given for designing both qualification tests and MTBF (mean time between failure) tests based on this data. Author

N83-30766# Gilbert/Commonwealth, Jackson, Mich.
DYNAMIC CHARACTERISTICS OF AN INDUCED-DRAFT FAN AND ITS FOUNDATION **c39**
S. P. Ying and E. E. Dennison *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Part 2 Sep. 1980 p 121-128 refs 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 20/11

Vibration problems of large induced-draft fans and dynamic responses of their foundations were investigated experimentally. The work included analyses of fan vibration spectra and determinations of vibration mode shapes. The natural resonant frequencies of the foundation were measured by using the transfer function technique with a dual channel Fast Fourier Transform (FFT) analyzer. The resonant behavior of the entire fan and foundation system was observed during start-up of a fan. The resonant characteristics are discussed with a theoretical model and the critical speed of the fan shaft. A problem of an unbalanced fan rotor which caused excessive vibration is described along with its correction to a normal condition. M.G.

N83-30767# IFM Akustibyran A.B., Stockholm (Sweden).
VIBRATION AND ACOUSTICS. A METHOD TO DETERMINE REALISTIC RANDOM VIBRATION TEST LEVELS TAKING INTO ACCOUNT MECHANICAL IMPEDANCE DATA. PART 1: BASIC IDEAS AND THEORY **c39**
Odd Sylwan *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Part 2 Sep. 1980 p 129-135 ref 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 20/11

A new method to determine more realistic random vibration test levels based on measured acceleration spectral densities was developed and tested. It takes into account the differences between the mechanical impedances of the system equipment - supporting structure in service and under test conditions. A very important feature of the method is that the vibration test is still performed in accordance with standard test procedures. The basic ideas and theory behind the method are presented. Author

N83-30768# Saab-Scania, Linkoping (Sweden).
A METHOD TO DETERMINE REALISTIC RANDOM VIBRATION TEST LEVELS TAKING INTO ACCOUNT MECHANICAL IMPEDANCE DATA. PART 2: VERIFICATION TESTS **c39**
Tryggve Hell *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Part 2 Sep. 1980 p 137-154 4 Vol. (For primary document see N83-30757 19-31)

Avail: NTIS HC A12/MF A01 CSCL 20/11

A new method to determine more realistic random vibration test levels based on measured acceleration spectral densities has been tested on the SSAB-SCANIA built antiship missile Rb 04E and four of its electronic equipment items. The different phases of the test program are presented: tests, measurements, signal analysis, and test results. Author

N83-30769# Imperial Coll. of Science and Technology, London (England).

VIBRATION ANALYSIS OF A HELICOPTER PLUS AN EXTERNALLY-ATTACHED STRUCTURE c05

D. J. Ewins, J. M. M. Silva, and G. Maleci *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Part 2 Sep. 1980 p 155-172 refs 4 Vol. (For primary document see N83-30757 19-31)

Avail: NTIS HC A12/MF A01 CSCL 01C

A vibration analysis was made of a complex structure comprising a helicopter airframe, external carrier platform and a store, in order to construct a mathematical model for use in a design optimization exercise. The model formed was based on impedance coupling of component substructures, using experimentally derived modal data for the airframe and store, and a finite element theoretical model of the carrier. Predictions for the complete assembly agreed well with data measured on the actual structure over much of the frequency range, although the accuracy was reduced at higher frequencies. Further investigation indicated that this effect was probably due to approximations made in the coupling conditions, rather than to limitations in the models of the substructures. The exercise demonstrates the usefulness of this type of analysis for complex engineering structures and also highlights some problems which may be encountered in applying theoretically straightforward techniques to practical cases. Author

N83-30770# Army Electronics Command, Fort Monmouth, N. J. Technical Support Activity.

IMPROVING VIBRATION TECHNIQUES FOR DETECTING WORKMANSHIP DEFECTS IN ELECTRONIC EQUIPMENT c38

John W. Burt and Michael A. Condouris *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Part 2 Sep. 1980 p 173-190 4 Vol. (For primary document see N83-30757 19-31)

Avail: NTIS HC A12/MF A01 CSCL 14D

The effectiveness of sine and random vibration for detecting workmanship defects in electronic equipment was evaluated and described. The vibration test program was based upon the use of a fastener cantilever beam device which effectively simulated workmanship defects that had first mode resonant frequencies between 27 and 880 Hz. It was found that both swept frequency sine and random vibration are very effective for detecting workmanship defects, but that sine vibration at a single non-resonant frequency, (2.2 g at a fixed non-resonant frequency) is very ineffective. Whether to use swept sine or random vibration for burn in depends on which type was used for design qualification. Further, it was found that the best results are achieved when burn in vibration is done at the design qualification amplitude.

Author

N83-30771# General Electric Co., Philadelphia, Pa. Space Div.

SINGLE-POINT RANDOM AND MULTI-SHAKER SINE SPACECRAFT MODAL TESTING c18

M. Ferrante, C. V. Stahle, and D. G. Breskman *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Part 2 Sep. 1980 p 191-198 refs 4 Vol. (For primary document

Avail: NTIS HC A12/MF A01 CSCL 22B

The modal test of the launch configuration of the DSC-3 spacecraft which consists of a tandem spacecraft configuration with a DSCS-2 atop a DSCS-3 is described. Single-Point Random (SPR) was used as the basic test technique, and a new Multi-Shaker Sine (MSS) testing technique was used to validate it by measuring selected modes. Although the two DSCS-3 solar arrays were removed and tested separately to eliminate clustered modes, the spacecraft exhibited a high modal density making accurate modal measurements difficult. The MSS results for these 15 modes were comparable with the SPR results except for two MSS modes which showed a marked improvement. During the test, major improvements in SPR procedures and data processing times were obtained by hardware and software changes. Data processing time was reduced by an order of magnitude. However, it is felt that additional refinements are needed before the SPR technique can be confidently applied to spacecraft testing. It does appear that SPR can be more cost effective than the MSS technique even for complex spacecraft modal testing. Author

N83-30772# Sandia Labs., Albuquerque, N. Mex.

BIAS ERRORS IN A RANDOM VIBRATION EXTREMAL CONTROL STRATEGY c39

D. O. Smallwood and D. L. Gregory *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Part 2 Sep. 1980 p 199-205 ref 4 Vol. (For primary document see N83-30757 19-31)

Avail: NTIS HC A12/MF A01 CSCL 20/11

The theoretical basis for an extremal control strategy in random vibration testing is discussed; except for special cases, this strategy results in bias errors. Formulas for estimating the bias are given, and methods for minimizing the error are suggested. The conclusion was reached that a sequential averager should not be used for this control strategy as its use will result in an unknown bias error. Author

N83-30773*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

A NEW METHOD OF IMPROVING SPECTRA SHAPING IN REVERBERANT CHAMBERS c16

James N. Scott and Raymond L. Burkhardt (Northrop Services, Inc.) *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Part 2 Sep. 1980 p 207-215 refs 4 Vol. (For primary document see N83-30757 19-31)

Avail: NTIS HC A12/MF A01 CSCL 22B

The use of acoustic suppression to line the horn duct of a reverberant noise chamber in an effort to enhance the spectrum shaping capability of the chamber is studied. This permitted the low frequency level to be increased to required values while attenuating the high frequency noise, thus achieving the required roll-off to simulate the Space Transportation System (STS) payload bay acoustic environment. The construction of the liner and the evaluation of the liner to determine its attenuation characteristics are described. Author

N83-30774# Wyle Labs., Inc., Colorado Springs, Colo.

THE VIBRATION TEST UNIT, A UNIQUE RAIL VEHICLE VIBRATION TEST FACILITY c09

R. O. Coupland and A. J. Nintzel *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Part 2 Sep. 1980 p 217-228 4 Vol. (For primary document see N83-30757 19-31)

Avail: NTIS HC A12/MF A01 CSCL 14B

The Vibration Test Unit, a twelve shaker vibration system designed to vibrate a railcar to simulate the action of track/train dynamics is described. It includes a description of the system and a summary of its performance capabilities. Author

N83-30775# Thiokol Corp., Brigham City, Utah.

LOW FREQUENCY STRUCTURAL DYNAMICS OF THE SPACE SHUTTLE SOLID ROCKET BOOSTER MOTOR DURING STATIC TESTS c20

M. A. Behring and D. R. Mason *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Part 2 Sep. 1980 p 235-239 refs 4 Vol. (For primary document see N83-30757 19-31)

Avail: NTIS HC A12/MF A01 CSCL 21/8

Low frequency oscillations in measured thrust have occurred during static testing of the Space Shuttle Solid Rocket Booster Motor. These measured thrust oscillations are believed to be associated with oscillations in chamber pressure, but are much larger than is directly attributed to observed pressure oscillations

from a ballistic consideration only. The development of a mathematical model simulating the motor in the test stand and analytical studies into the effects of small amplitude, chamber pressure oscillations on measured thrust are described. Author

N83-30776# Thiokol Corp., Brigham City, Utah.
VIBRATION ENVIRONMENT OF THE SPACE SHUTTLE SOLID ROCKET BOOSTER MOTOR DURING STATIC TESTS c20
D. R. Mason and M. A. Behring *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Part 2 Sep. 1980 p 241-245 refs 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 21/8

During motor development, four Space Shuttle Booster solid rocket motors were static tested in the Thiokol T-24 facility. On these motor tests, the self-induced vibration environment was monitored at numerous locations on the motor. The results of this vibration environment survey are summarized and results compared to flight criteria established by NASA for locations on the motor. Author

N83-30777# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ELIMINATION OF A DISCRETE FREQUENCY ACOUSTICAL PHENOMENON ASSOCIATED WITH THE SPACE SHUTTLE MAIN ENGINE OXIDIZER VALVE-DUCT SYSTEM c16
L. A. Schutzenhofer, J. H. Jones, R. E. Jewell, and R. S. Ryan *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Part 2 Sep. 1980 p 247-255 refs 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 22B

In the development of the Space Shuttle Main Engines, various unpredictable dynamical phenomena were experienced which resulted in engine shutdown or failures, e.g., fires. One such dynamical phenomenon consisted of an acoustical buzz at 7200 Hz in the vicinity of the main oxidizer valve. The method of isolating the buzz phenomenon, identifying the mechanism, and developing a fix to eliminate the buzz is presented together with supporting data. These data, i.e., fluctuating pressure and acceleration data, were obtained from hot firing engine tests and from liquid nitrogen flow simulation tests conducted at Marshall Space Flight Center. Author

N83-30778# Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION BULLETIN, NO. 50. PART 3: DYNAMIC ANALYSIS, DESIGN TECHNIQUES
Sep. 1980 207 p refs The 50th Symp. on Shock and Vibration, held at Colorado Springs, 16-18 Oct. 1979 4 Vol.
(Bull-50-Pt-3) Avail: NTIS HC A10/MF A01 CSCL 20/11

Shock and vibration dynamics were examined. Some of the topics discussed are: dynamic analyses; design techniques; measurement techniques and data analysis; dynamic measurements; vibration and acoustics; applications of materials; and fragments. For individual titles, see N83-30779 through N83-30793.

N83-30779# Ohio State Univ., Columbus. Dept. of Engineering Mechanics.
THE RELATIVE COMPLEXITIES OF PLATE AND SHELL VIBRATIONS c39
A. W. Leissa *In* Shock and Vibration Bull., No. 50, Part 3 Sep. 1980 p 1-10 refs (For primary document see N83-30778 19-31)
Avail: NTIS HC A10/MF A01 CSCL 20/11

The vibrations of plates and shells was investigated. The various complexities which can arise were separated and those which typically exist in shell vibration problems that are not usually found in plates are identified. E.A.K.

N83-30780# Naval Underwater Systems Center, Newport, R.I.
IN-FLUID CYLINDRICAL BEAM VIBRATION WITH MULTI-DEGREE OF FREEDOM ABSORBERS c39
B. E. Sandman and J. S. Griffin *In* Shock and Vibration Bull., No. 50, Part 3 Sep. 1980 p 11-20 refs (For primary document see N83-30778 19-31)
Avail: NTIS HC A10/MF A01 CSCL 20/11

The theoretical study of the effects of vibration absorbers with two point attachments with both translation and rotational degrees of freedom were considered. The dual tuning of rocking and transplating absorber resonances to produce attenuation of two low order beam mode resonance are demonstrated. Cantilevered and free free hollow Timoshenko beam configurations are utilized. It is shown that the location of attachment points and the effect of fluid loading induced by the motion on the beam in a heavy fluid medium such as water are significant factors in terms of absorber optimization. The analysis can be directly applied for consideral and all types of boundary conditions for the beam. It is found that the immediate extension to the study of cylindrical shells which contain numerous attachments of internal components and arbitrary boundary conditions can be achieved without severe modifications of the procedures. E.A.K.

N83-30781# San Diego State Univ., Calif. Coll. of Engineering.
DYNAMIC STABILITY OF FIBROUS COMPOSITE CYLINDERS UNDER PULSE LOADING c24
Robert J. Stuart and Sangiahnadar Dharmarajan *In* Shock and Vibration Bull., No. 50, Part 3 Sep. 1980 p 21-26 refs (For primary document see N83-30778 19-31)
Avail: NTIS HC A10/MF A01 CSCL 11/4

The stability of composite cylindrical shells with general boundary conditions subjected to pressure pulse loads was investigated. The governing differential equations of motion of an orthotropic cylindrical shell subjected to normal pressure are reduced to generalized Donnell's cylindrical shell theory. These equations are further reduced to a single eight order differential equation in terms of the radial displacement. The governing differential equation is solved by assuming a solution in the form of a product. A simple computational algorithm is presented for finding the growth of deflections when the pressure pulse exceed the static buckling pressure. The method may be used for all boundary conditions that may be solved in the vibrating beam problem. E.A.K.

N83-30782# Oklahoma Univ., Norman.
TRANSFER-MATRIX ANALYSIS OF DYNAMIC RESPONSE OF COMPOSITE-MATERIAL STRUCTURAL ELEMENTS WITH MATERIAL DAMPING c24
M. M. Wallace and C. W. Bert *In* Shock and Vibration Bull., No. 50, Part 3 Sep. 1980 p 27-38 refs (For primary document see N83-30778 19-31)
Avail: NTIS HC A10/MF A01 CSCL 11/4

A simple one dimensional finite element technique utilizing transfer matrix analysis is used to calculate the flexural and torsional natural frequencies for specimens made from planar naisotropic materials. The theory is based on Lekhnitskii's theory for static torsional flexural coupling and Timoshenko's beam theory for transverse shear and rotatory inertia. This method was used to evaluate a specific structural element with length to width ratio of 6:6. This particular structural element was previously investigated experimentally and analytically as a thin plate element. Good agreement among all of the techniques for natural frequencies and the associated nodal contours is demonstrated. E.A.K.

N83-30783# Technische Universitaet, Munich (West Germany).
CONTRIBUTIONS TO THE DYNAMIC ANALYSIS OF MAGLEV VEHICLES ON ELEVATED GUIDEWAYS c85
K. Popp *In* Shock and Vibration Bull., No. 50, Part 3 Sep. 1980 p 39-62 refs (For primary document see N83-30778 19-31)
Avail: NTIS HC A10/MF A01 CSCL 13F

Maglev vehicles on elevated guideways can be economically used to solve transportation problems involving speeds of up to 400 km/h. Feedback control methods for the dynamic analysis of Maglev vehicles moving on flexible guideways are reviewed: From models for the vehicle, suspension and guideway, the mathematical open loop description is obtained systematically resulting a high

order linear state equation with periodic time varying coefficients and jumping states. The control system design, however, calls for simple low order models which are approached in different ways. A stability analysis is given for the resulting closed loop system and steady state responses to deterministic and stochastic disturbances are calculated using common numerical simulation techniques and procedures which are based on Floquet theory. The methods are demonstrated and the influence of the different design parameters are shown. E.A.K.

N83-30784# Westinghouse Research and Development Center, Pittsburgh, Pa.
DYNAMICS OF LONG VERTICAL CABLES **c39**
F. H. Wolff *In* Shock and Vibration Bull., No. 50, Part 3 Sep. 1980 p 63-70 refs (For primary document see N83-30778 19-31)
Avail: NTIS HC A10/MF A01 CSCL 20/11

Natural periods of vibration of cables are determined from the homogeneous solution to the equation of motion for a flexible string which is fixed at both ends and stretched under applied tension. Curves containing fundamental periods of vibration for cables of various weights per unit length and applied tension conditions are presented as a function of cable length. The solutions of the classical vibrating string are compared to illustrate the discrepancies that would occur if the massive cables were modeled as the classical vibrating string. E.A.K.

N83-30785# Florida Univ., Eglin AFB. Graduate Engineering Center.
RESPONSE AND FAILURE OF UNDERGROUND REINFORCED CONCRETE PLATES SUBJECTED TO BLAST **c39**
C. A. Ross, C. C. Schauble, and P. T. Nash (USAF Armament Lab., Eglin AFB, Fla.) *In* Shock and Vibration Bull., No. 50, Part 3 Sep. 1980 p 71-82 refs (For primary document see N83-30778 19-31)
(Grant AF-AFOSR-3592-78)
Avail: NTIS HC A10/MF A01 CSCL 20/11

Plate response and subsequent failure of buried reinforced slabs subjected to a small explosive was studied. Material fracture of concrete reinforcing element at some pont in the slab is described. Experimentally for underground slabs with fixed or simply supported edges four failure modes were observed: (1) stationary hinge mechanism with hinges at edges and extending from corners to slab center; (2) a moving hinge mechanism with fixed hinges at the edges and interior hinges moving toward the center of the slab; (3) localized failure of concrete and reinforcing elements when small explosive is very close to slab; and (4) complete shear of the edges of the slab before hinge mechanisms begin. Modes 1 and 2 are studied and the equations of motion to describe these response modes are derived. The analysis is based on an assumed plastic hinge or yield line response used previously for metal plates and statistically loaded reinforced concrete slabs. E.A.K.

N83-30786*# Old Dominion Univ., Norfolk, Va. Dept. of Mechanical Engiering and Mechanics.
LIMITATIONS ON RANDOM INPUT FORCES IN RANDOMDEC COMPUTATION FOR MODAL IDENTIFICATION **c39**
S. R. Ibrahim *In* Shock and Vibration Bull., No. 50, Part 3 Sep. 1980 p 99-112 refs Sponsored in part by NASA (For primary document see N83-30778 19-31)
Avail: NTIS HC A10/MF A01 CSCL 20K

The condition of having white noise random input to test structures has been proven unnecessary for the purpose of using random decrement technique for modal identification of vibrating structures. In this paper it is shown that nonwhite, stationary narrow band random inputs will yield modal parameters as accurate as those obtained if the inputs were narrow band white noise. Seven simulated experiments are included in support of the material presented in this paper. Author

N83-30787# Bonneville Power Administration, Portland, Oreg.
STRUCTURAL-DYNAMIC CHARACTERIZATION OF AN EXPERIMENTAL 1200-KILOVOLT ELECTRICAL TRANSMISSION-LINE SYSTEM **c39**
Leon Kempner, Jr., Strether Smith (Synergistic Technology, Inc., Cupertino, Calif.), and Richard C. Stroud (Synergistic Technology, Inc., Cupertino, Calif.) *In* Shock and Vibration Bull., No. 50, Part 3 Sep. 1980 p 113-124 refs (For primary document see N83-30778 19-31)
Avail: NTIS HC A10/MF A01 CSCL 20/11

This paper describes an investigation conducted to establish, by correlation of analytically and experimentally derived results, credibility for tructural and structural-dynamic modeling procedures under development at BPA. The approach was to formulate an analytical model of one of the suspension towers and compare the modal characteristics of that idealization with measured properties obtained with a modal survey. The SPAR (1)* finite-element program was used for a theoretical analysis of the tower. The entire test sequences was performed analytically prior to the experimental phase to determine safe and adequate loadings and to establish instrumentation gains. The suitability of the instrument distribution was verified by an orthogonality check of theoretical eigenvectors, truncated to instrument locations. B.W.

N83-30788*# Spar Aerospace Ltd., Toronto (Ontario).
ANALYSIS AND DESIGN OF THE SHUTTLE REMOTE MANIPULATOR SYSTEM MECHANICAL ARM FOR LAUNCH DYNAMIC ENVIRONMENT **c16**
D. M. Gossain, E. Quittner, and S. S. Sachdev *In* Shock and Vibration Bull., No. 50, Part 3 Sep. 1980 p 125-149 refs Sponsored in part by NASA (For primary document see N83-30778 19-31)
Avail: NTIS HC A10/MF A01 CSCL 22B

The Remote Manipulator System (RMS) is a part of the payload handling system of the U.S. Space Shuttle Orbiter. It comprises the orbiter-mounted hardware installed in the payload bay and the crew compartment. The payload bay equipment consists essentially of a Manipulator Arm. This paper presents an overview of the design and analysis studies undertaken for the stowed MA, the problems encountered and their solutions. The data presented here are typical and for discussion only since they are subject to update/revision in the design/development process. B.W.

N83-30789# Marquardt Corp., Van Nuys, Calif.
STRUCTURAL DYNAMIC CHARACTERISTICS OF THE SPACE SHUTTLE REACTION CONTROL THRUSTERS **c16**
Gersten L. Schachne and Jeffrey H. Schmidt *In* Shock and Vibration Bull., No. 50, Part 3 Sep. 1980 p 151-162 refs (For primary document see N83-30778 19-31)
Avail: NTIS HC A10/MF A01 CSCL 22/2

Several configurations of the reaction control thrusters for the Space Shuttle Orbiter were structurally analyzed using finite element models. Acceleration responses and frequencies from these analyses were compared with those recorded during random vibration tests. Various methods for determining structural damping were considered from which one, comparison of test and analytic g sub rms, was selected. The resulting analytical dynamic characterization of the structure led to successfully designed and qualified thrusters. Author

N83-30790# Lockheed Missiles and Space Co., Sunnyvale, Calif.
MODIFICATION OF FLIGHT VEHICLE VIBRATION MODES TO ACCOUNT FOR DESIGN CHANGES **c05**
C. W. Coale and M. R. White *In* Shock and Vibration Bull., No. 50, Part 3 Sep. 1980 p 163-178 (For primary document see N83-30778 19-31)
Avail: NTIS HC A10/MF A01 CSCL 01C

A method of incorporating spacecraft structural changes by modifying existing flight vehicle modes is presented. The method is applicable for arbitrary changes of mass, stiffness, and structural configuration in a limited area of the vehicle. Author

N83-30791# Air Force Weapons Lab., Kirtland AFB, N. Mex.
EVALUATION OF AIRBORNE LASER BEAM JITTER USING STRUCTURAL DYNAMICS COMPUTER CODES AND CONTROL SYSTEM SIMULATIONS **c36**

C. L. Budde, P. H. Merritt, and C. D. Johnson (Anamet Lab., Inc., San Carlos, Calif.) *In* Shock and Vibration Bull., No. 50, Part 3 Sep. 1980 p 179-188 refs (For primary document see N83-30778 19-31)
Avail: NTIS HC A10/MF A01 CSCL 20/5

Beam stabilization for the Airborne Laser Laboratory (ALL) is accomplished by inertially stabilizing an annular reference mirror attached to the beam expanding telescope on the Airborne Pointing and Tracking System (APT). The analysis reported here documents the calculation of the residual beam jitter due to vibrations of the ALL and required the use of the NASTRAN finite element computer code to determine the motion of the various optical elements in the beam expanding telescope. These motions were then combined in an analytical expression to calculate the optical path motion for both the high energy laser and autoalignment beams. The final step was the incorporation in the frequency domain of the effects of the two servo mechanisms that stabilize the telescope to an inertial reference and drive the beam steering mirror to align the autoalignment beam and the high energy laser beam to the annular reference mirror. Author

N83-30792# General Electric Co., Utica, N. Y. Aircraft Equipment Div.
FATIGUE LIFE PREDICTION FOR MULTILEVEL STEP-STRESS APPLICATIONS **c39**
Ronald G. Lambert *In* Shock and Vibration Bull., No. 50, Part 3 Sep. 1980 p 189-200 refs (For primary document see N83-30778 19-31)
Avail: NTIS HC 10/MF A01 CSCL 20/11

A cumulative fatigue damage procedure is developed which uses linear elastic fracture mechanics theory as its basis in order to predict the fatigue life of structures subjected to multilevels of sequentially applied stress. The applied stress can be sinusoidal or random. The material's fatigue curve is treated as a scatterband of failure points. Author

N83-30793# Westinghouse Research and Development Center, Pittsburgh, Pa.
LATERAL INSTABILITY DURING SPIN TESTS OF A PENDULOUSLY SUPPORTED DISC **c39**
F. H. Wolff, A. J. Molnar, G. O. Sankey, and J. H. Bitzer *In* Shock and Vibration Bull., No. 50, Part 3 Sep. 1980 p 201-208 refs (For primary document see N83-30778 19-31)
Avail: NTIS HC A10/MF A01 CSCL 20/11

The spin test facility experienced two shaft failures while studying crack growth properties in a low cycle fatigue disc specimen. The failures were attributed to lateral vibrations of a low frequency whirl instability occurring because of shaft hysteresis, looseness of bolts connecting mating components of the rotor, and insufficient external damping. Theory and experimental verification are presented which permit lateral instabilities of pendulously supported disc systems to be calculated. Author

N83-30794# Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION BULLETIN, NO. 50. PART 4: DYNAMIC PROPERTIES OF MATERIALS, APPLICATIONS OF MATERIALS, SHOCK AND BLAST, FRAGMENTS
Sep. 1980 229 p refs The 50th Symp. on Shock and Vibration, held at Colorado Springs, 16-18 Oct. 1979 4 Vol.
(Bull-50-Pt-4) Avail: NTIS HC A11/MF A01 CSCL 20/11

Fatigue tests of composite structures as well as procedures for predicting the dynamic response of structures and determining adequate vibration isolation are examined. Shock analysis and testing methods, fragment penetration, and explosive ignition are also considered. For individual titles, see N83-30795 through N83-30811.

N83-30795# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. Dept. of Aeronautics and Astronautics.
MATERIAL DAMPING AS A MEANS OF QUANTIFYING FATIGUE DAMAGE IN COMPOSITES **c24**
Peter J. Torvik and Cynthia Bourne *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50, Part 4 Sep. 1980 p 1-12 refs (For primary document see N83-30794 19-31)
Avail: NTIS HC A11/MF A01 CSCL 11/4

The possibility of using damping measurements as a nondestructive means of quantifying damage accumulation during the fatigue life of composites was considered. Damping measurements were made during the course of fatigue studies on a graphite epoxy composite using both the logarithmic decrement and the bandwidth techniques. Measurable increases in damping were observed during the service life, but no dramatic change was encountered immediately prior to failure. Since the changes were moderate, and gradual, these experiments suggest that damping can be used as an index of cumulative damage in composites, but that the results should be used with caution and regarded as more qualitative than quantitative. Author

N83-30796*# Lockheed-California Co., Burbank.
SONIC FATIGUE TESTING OF THE NASA L-1011 COMPOSITE AILERON **c05**
J. Soovere *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50, Part 4 Sep. 1980 p 13-24 refs (For primary document see N83-30794 19-31)
(Contract NAS1-15069)
Avail: NTIS HC A11/MF A01 CSCL 01C

The sonic fatigue test program to verify the design of the composite inboard aileron for the L-1011 airplane jet noise environment is described. The composite aileron is fabricated from composite minisandwich covers which are attached to graphite/epoxy front spar and ribs, and to an aluminum rear spar with fasteners. Coupon testing, with large electromagnetic shakers, is used to develop random S/N (stress vs. number of cycles) data for specific components in the design. Coupon failure modes are presented and discussed. The center section of the composite aileron is mounted by its hinge fittings to a test frame and sonic fatigue tested in an acoustic progressive wave tunnel. The testing involves modal studies to establish mode shapes, modal frequencies and damping, and a panel response nonlinearity test culminating in the accelerated sonic fatigue proof test. Author

N83-30797# Alabama Univ., Huntsville. Dept. of Industrial and Systems Engineering.
MODELING A TEMPERATURE SENSITIVE CONFINED CUSHIONING SYSTEM **c39**
Virginia P. Kobler (Army Missile Command), Richard M. Wyskida, and James D. Johannes *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50, Part 4 Sep. 1980 p 25-34 refs (For primary document see N83-30794 19-31)
Avail: NTIS HC A11/MF A01 CSCL 20/11

The impact response for the Minicel cushioning material in the confined state was determined through the development of an experimental drop test design, conducting an extensive drop test program, and then modelling the resultant test data. General mathematical models are presented for a confined cushioning system and for the exterior container which surrounds the confined corner void configured cushions. A.R.H.

N83-30798# Army Engineer Div., Huntsville, Ala.
PRELIMINARY HARDNESS EVALUATION PROCEDURE FOR IDENTIFYING SHOCK ISOLATION REQUIREMENTS **c39**
Richard J. Bradshaw, Jr. and Paul N. Sonneburg (Army Construction Engineering Research Lab.) *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50, Part 4 Sep. 1980 p 35-58 refs (For primary document see N83-30794 19-31)
Avail: NTIS HC A11/MF A01 CSCL 20/11

There is a need to develop a procedure based on past test experience that can be used during the early design phase to identify shock isolation requirements. The procedure would provide designers a more concrete basis for making decisions concerning isolation requirements prior to receiving the results of the hardness verification program. Such a procedure, based on the shock test results for the equipment installed in the SAFEGUARD Ballistic Missile Defense System, is presented. These shock tests cover over 300 commercial items of equipment found in mechanical

and electrical systems. The test data were used to verify the hardness of over 30,000 items of equipment. In addition, the data base may be the largest and most extensive in existence for go/no-go shock testing of commercial equipment hardness to nuclear shock environments. The procedure is written to and for designers of future land-based hardened facilities (nuclear or non-nuclear) that use commercial equipment for which no fragility data exists. Author

N83-30799# Commonwealth Scientific and Industrial Research Organization, Sydney (Australia). Div. of Applied Physics.
AN APPLICATION OF TUNED MASS DAMPERS TO THE SUPPRESSION OF SEVERE VIBRATION IN THE ROOF OF AN AIRCRAFT ENGINE TEST CELL **c39**
J. L. Goldberg, N. H. Clark, and B. H. Meldrum *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50, Part 4 Sep. 1980 p 59-68 refs (For primary document see N83-30794 19-31)
Avail: NTIS HC A11/MF A01 CSCL 20/11

Tuned mass dampers were applied to suppress severe vibration in the concrete roof panels of a building used for testing constant speed turbopropeller aircraft engines. A basis for design of the dampers is described. The size and number of absorber masses and the characteristics of the spring required to effectively suppress the particular mode of the panel are determined from calculations of the modal energy using experimentally measured data. The procedure is illustrated by examining the response of the slab situated above the propeller and subjected to the strongest excitation. The untreated slab, of mass estimated to be in excess of 10 tons between wall supports, vibrates with a peak velocity amplitude of 24 mm/sec in a (3.1) mode. When treated with two absorbers of total mass 470 kg, the velocity amplitude is reduced to a safe value of 4 mm/sec in the worst region of the slab. The relevance of this reduction in satisfying vibration safety criteria is discussed. Author

N83-30800# Lord Kinematics, Erie, Pa.
COMPARISON OF ANALYTICAL AND EXPERIMENTAL RESULTS FOR A SEMI-ACTIVE VIBRATION ISOLATOR **c39**
E. J. Krasnicki *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50, Part 4 Sep. 1980 p 69-76 refs (For primary document see N83-30794 19-31)
Avail: NTIS HC A11/MF A01 CSCL 20/11

A single degree of freedom system employing an active damper, used as a semi-active vibration isolation device, was successfully reduced to practice. A laboratory prototype was fabricated and tested. Test results of the active damper performance, subject to both sinusoidal and random vibrational input, are discussed and compared to recent analytical simulations. Author

N83-30801*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
AN EXPERIMENTAL INVESTIGATION OF NOISE ATTENUATING TECHNIQUES FOR SPACE-SHUTTLE CANISTERS **c16**
L. Mirandy (General Electric Co.), Frank J. On, and J. Scott *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50, Part 4 Sep. 1980 p 77-90 refs (For primary document see N83-30794 19-31)
(Contract NAS5-23412)
Avail: NTIS HC A11/MF A01 CSCL 22B

A model of the space shuttle thermal canister was acoustically tested to determine the amount of noise attenuation which could be derived using a simple, single-wall canister construction having rectangular shape. Acoustic testing was performed on the basic canister and with noise-attenuating design modifications. The basic canister experienced noise amplifications at 56 and 80 Hz, which are attributed to the fundamental canister acoustic mode and local panel structural resonances, respectively. The standing wave response at 56 Hz was effectively suppressed by the incorporation of a cardboard baffle midway between the canister end-caps (an additional overall noise reduction of 4 dB). The canister was next tested with 14%, 22.5% and 31% sound absorptive coverages on the interior walls. The coverage was effective between 400-3000 Hz; the maximum benefit (9 dB) occurring at 1600 Hz. Viscoelastic damping strips bonded to the canister exterior provided an additional 4 to 5 dB attenuation over much of the frequency range and has an overall reduction of about 10 dB as compared to 4.4 dB without damping. A significant reduction of the resonant effect at 80 Hz was noted. A.R.H.

N83-30802# General Electric Co., Philadelphia, Pa. Space Div.
DYNAMIC INTEGRITY METHODS INCLUDING DAMPING FOR ELECTRONIC PACKAGES IN RANDOM VIBRATION **c39**
J. M. Medaglia *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50, Part 4 Sep. 1980 p 91-104 refs (For primary document see N83-30794 19-31)
Avail: NTIS HC A11/MF A01 CSCL 20/11

Although large printed wiring boards (PWBs) allow more efficient electronic design, ordinary stiffness design methods often fail to meet the response deflection and acceleration design criteria needed to minimize failure rates. In many cases, constrained layer viscoelastic damping can enhance other design practices by replacing ordinary ribs to produce adequate stiffness plus response magnifications of less than 10. Recently composite material graphite-epoxy constraining layers were applied to reduce the size and weight needed to ruggedize PWBs. This being a large departure from previous successful damping designs, tests were conducted to verify the performance of the new facets of the damping method and to verify simple techniques for assessing the integrity of PWBs. The tests also verified that the same techniques properly predict when damping is needed and what strip positions are effective. A.R.H.

N83-30803# Technische Hochschule, Darmstadt (West Germany). Inst. fuer Mechanik.
AN OVERVIEW OF SHOCK ANALYSIS AND TESTING IN THE FEDERAL REPUBLIC OF GERMANY **c39**
K.-E. Meier-Doernberg *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50, Part 4 Sep. 1980 p 105-116 refs (For primary document see N83-30794 19-31)
Avail: NTIS HC A11/MF A01 CSCL 20/11

Data reduction techniques used in the West German standard "Shock Safety Requirements for Installations in Shelters" lead to a coherent presentation of input and tolerance data, define a way of comparing the various design methods, and sum up the numerous research results. Topics discussed include: the format of data presentation (the shock net); characteristics features of shock functions (the shock polygon); shock response spectra; shock relevant system properties (the exposure polygon); sources of input data; classification of shock performance; shock test evaluation; simplified design analysis methods; shock isolation, and shock test machines. A.R.H.

N83-30804# New Mexico Univ., Albuquerque.
CONSERVATISM IN SHOCK ANALYSIS AND TESTING **c39**
Thomas L. Paez *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50, Part 4 Sep. 1980 p 117-136 refs (For primary document see N83-30794 19-31)
Avail: NTIS HC A11/MF A01 CSCL 20/11

It is shown how the probability of conservatism of a shock test can be approximately calculated when some shocks measured from the random field source are available. When a structure is to be subjected to mechanical shocks in the field, it is desirable to test that structure using a shock test which is conservative with respect to the field shock inputs. The method of shock response spectra can be used to obtain a shock test which is conservative, in some sense, with respect to multiple field shocks measured in the past. But when the adequacy of a structure is to be proven for inputs which will occur in the future, and when the shock source under consideration is random, then any given test may or may not be conservative with respect to the future inputs. For a particular shock test there exists a probability of conservatism. R.J.F.

N83-30805# Agbabian Associates, El Segundo, Calif.
MEASUREMENT OF DYNAMIC STRUCTURAL CHARACTERIS-

TICS OF MASSIVE BUILDINGS BY HIGH-LEVEL MULTIPULSE TECHNIQUES c39

D. G. Yates and F. B. Safford *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50, Part 4 Sep. 1980 p 137-148 refs (For primary document see N83-30794 19-31)
Avail: NTIS HC A11/MF A01 CSCL 20/11

Multipulsed high-level structural testing is an innovative approach to high-level transient testing. A portable impulse device of recent development produces large force time histories that can be controlled to satisfy multimode system response. The pulse shapes provides an input Fourier spectrum concentrated in the desired frequency region with input force amplitude as high as 60,000 pounds-force. This testing machine is a metal-cutting device in which a multiple-blade cutter cuts through a series of metal projections called nubbins. Judicious design of the cutter, nubbin shapes, cutting velocity, and energy source produces various pulse amplitudes, shapes, and durations. The force pulse generates high output forces for time durations sufficient to mobilize structural modes and compatible with digital signal capture. R.J.F.

N83-30806# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Mechanical Engineering.

CONSIDERATION OF AN OPTIMAL PROCEDURE FOR TESTING THE OPERABILITY OF EQUIPMENT UNDER SEISMIC DISTURBANCES c39

C. W. deSilva, F. Loceff (Westinghouse Nuclear Energy Systems), and K. M. Vashi (Westinghouse Nuclear Energy Systems) *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50, Part 4 Sep. 1980 p 149-158 refs (For primary document see N83-30794 19-31)
Avail: NTIS HC A11/MF A01 CSCL 20/11

An optimal single-shaker test procedure is developed for the seismic qualification of Class 1E multicomponent electrical equipment. The method comprises a single test that uses an uniaxial excitation having certain minimum intensity applied at the equipment support location in a predetermined optimal direction. Analytical expressions for the optimal test parameters are obtained by maximizing the risk of component failure during testing. The apriori evaluation of these parameters requires a frequency response test. The optimization problem is expressed as a matrix eigenvalue problem. The primary advantages of the proposed method over the currently employed four-rotation test simulating tri-axial input are reduction of the test duration, minimization of the excitation intensity and elimination of unnecessary overtesting in the vertical direction. The test procedure may be fully automated. Author

N83-30807# Florida Univ., Gainesville. Dept. of Engineering Sciences.

DYNAMIC LOADING OF METAL RIVETED JOINTS c39

R. L. Sierakowski, C. A. Ross, J. Hoover, and W. S. Strickland (Air Force Armament Lab.) *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50, Part 4 Sep. 1980 p 159-174 refs (For primary document see N83-30794 19-31)
(Grant AF-AFOSR-3157-76)
Avail: NTIS HC A11/MF A01 CSCL 20/11

The results of a series of tests to determine the effects of dynamic loading on riveted joints of thin metal structures are given. Dynamic tests were performed on strain gage instrumented tensile specimens with a precut central hole to determine the effect of stress concentrations. Results showed that dynamic stress concentrations are of the same order of magnitude as the corresponding static stress concentrations. Dynamic tests were also conducted on riveted tensile specimens of various types. The same general fracture (failure) modes observed in failed static specimens were also observed in the dynamic tests. Comparison of the results of the dynamic tensile test data with results of blast loaded riveted panels showed very good qualitative agreement. These full scale tests on flat panels with riveted edges and instrumented with strain gages were conducted using a fuel-air-explosive device as the dynamic loading. Strain-time histories for interior points of the panel as well as along the rivet lines were recorded. Experimental techniques used introducing the blast loading and strain gage instrumentation are included. R.J.F.

N83-30808# Sandia Labs., Albuquerque, N. Mex. Explosives Testing Div.

PREDICTING THE MOTION OF FLYER PLATES DRIVEN BY LIGHT-INITIATED EXPLOSIVE FOR IMPULSE LOADING EXPERIMENTS c37

R. A. Benham *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50, Part 4 Sep. 1980 p 191-198 refs Sponsored in part by DOE (For primary document see N83-30794 19-31)
Avail: NTIS HC A11/MF A01 CSCL 20/11

The possibility of using light-initiated high explosive to accelerate thin flyer plates to high velocities for impulse loading which may produce both material and structural response is discussed. A simplified model of the explosive multipoint detonation and expansion process is developed which leads to a calculation of the motion of the flyer plate. Comparisons between calculations and measurements from experiments indicate that the simplified model is sufficient for flyer motion predictions. Impulse experiments using light-initiated explosive to produce both material and structural response can now be designed. R.J.F.

N83-30809# Southwest Research Inst., San Antonio, Tex.

SCALING OF INITIATION OF EXPLOSIVES BY FRAGMENT IMPACT c28

W. E. Baker, M. G. Whitney, and V. B. Parr *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50, Part 4 Sep. 1980 p 199-212 refs (For primary document see N83-30794 19-31)
(Contract DACA87-79-C-0091)
Avail: NTIS HC A11/MF A01 CSCL 19/1

A similitude analysis of the scaling of the initiation of explosives by impact is given. Scaling of test results from the literature, and a careful survey of the scaled results are given. Correlations are made of the scaled results from various investigators, and implications drawn regarding the physics of the initiation processes for fragment impacts on bare and cased explosives. Scaled prediction curves are given, with error bands. R.J.F.

N83-30810# Research Inst. of National Defence, Stockholm (Sweden).

EQUATIONS FOR DETERMINING FRAGMENT PENETRATION AND PERFORATION AGAINST METALS c37

Ingrid M. Gyllenspetz *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50, Part 4 Sep. 1980 p 213-222 refs (For primary document see N83-30794 19-31)
Avail: NTIS HC A11/MF A01 CSCL 13/9

To use computer models successfully to calculate munitions effects in targets, one must be able to calculate fragment impact. These equations must be functional for fragments of different materials, sizes and velocities, and for plates of various thicknesses and materials. The equations used today in both Sweden and the United States are based on test data and contain constants that represent many parameters. Therefore, to use these equations for new relationships, new test data are needed. Similitude modeling makes it possible to develop approximate equations covering a wide range of variations in the parameters. The equations presented can be useful in simplified munitions effects calculations and for estimations when no test data are available. The test data and equations found in the literature are used to validate these equations and show the relationships of the nondimensional terms. R.J.F.

N83-30811# Sandia Labs., Albuquerque, N. Mex. Explosives Testing Div.

BREACHING OF STRUCTURAL STEEL PLATES USING EXPLOSIVE DISKS c28

D. L. Shirey *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50, Part 4 Sep. 1980 p 223-231 refs (For primary document see N83-30794 19-31)
Avail: NTIS HC A11/MF A01 CSCL 19/1

Methods for predicting the threshold for explosive breaching of structural steel plates are described. Both empirical and theoretical methods of predicting charge size were developed for explosive disks. Theory is compared with test results. Experiments are discussed which investigate the residual energy remaining in a sheared plug when the breaching threshold is exceeded. R.J.F.

N83-30812# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.

WIND DATA FOR BUILDING VENTILATION IN SELECTED US CITIES

C. L. Robbins and K. C. Hunter Mar. 1983 19 p refs
(Contract DE-AC02-77CH-00178)
(DE83-009182; SERI/TP-254-1802) Avail: NTIS HC A02/MF A01

Wind data for incorporation into natural ventilation of buildings generated for 80 cities in the United States are documented. The source and methodology for generating the data, and an example of an application are presented. The data include average and mean hourly wind speed and direction, annual bin wind data, and monthly bin wind data. The data were derived from the hourly wind speed and direction measurements contained on the Typical Metoerological Year (TMY) and Estimated Typical Meteorological Year (ETMY) weather tapes. Data allow to perform hourly simulations for a building. DOE

N83-30813# Colorado State Univ., Fort Collins. Fluid Dynamics and Diffusion Lab.

WIND-TUNNEL RESEARCH OF FLOWFIELDS WITHIN NATURALLY VENTILATED ROOMS OF SIMPLE GEOMETRY

M. Poreh, J. E. Cermak, and J. A. Peterka Sep. 1982 64 p refs
(Contract DE-AC03-80SF-11510)
(DE83-008110; DOE/SF-11510/T1) Avail: NTIS HC A04/MF A01

The flowfield created within a box like structure containing two windows was investigated for three configurations of the structure. The pressure distributions on the closed windows and the pressure at the same locations with open windows were measured and related to the approach flow. The mean air speed and the turbulence intensities near the windows and at various locations inside the rooms were measured using an omni-directional hot-film probe and a vertical, cylindrical hot-film probe. The air speed inside the room and at the windows was related to the approach flow and the pressures on the closed windows. Flow visualization using smoke and cotton tufts was used to study the flow patterns and the direction of the air flow at various locations inside each structure. Black and white photographs showing the basic features of the flow are presented. DOE

N83-30814# Brookhaven National Lab., Upton, N. Y. Dept. of Energy and Environment.

BUOYANCY-INDUCED FLOW STUDIES IN THERMALLY STRATIFIED LOOP OF A DOUBLE-ENVELOPE BUILDING

H. T. Ghaffari and R. F. Jones 1983 7 p refs Presented at the 6th Ann. ASME Tech. Conf. on Com. Bldg. Heating and Cooling Appl., Orlando, Fla., 26-30 Apr. 1983
(Contract DE-AC02-76CH-00016)
(DE83-005908; BNL-32417; CONF-830405-11) Avail: NTIS HC A02/MF A01

There is a wide interest in the flow studies of thermally stratified loops of double-envelope houses. These loops primarily serve to hold a moderate air temperature around the inner buildings, and to reduce thermal losses and air movements into the house by diminishing infiltration. Further, if the thermal mechanism of the buildng is well designed, it may be possible to cause a solar-assisted, buoyancy-induced cycling of the flow during the day and a probable reverse cycling during the night. The benefits of this flow pattern are a possible storage of heat in the ground level of the crawl space during the day, its retrieval at night, and a better mixing of warmed air in various zones of the loop. The double-envelope section of the buildng was monitored from October 1981 to October 1982. Data collected were debugged and the monitoring system was adjusted and calibrated. Results from this experiment concerning significant local flows are analyzed. Hence, a validation of the conceptual thermal mechanism is obtained, and empirical and analytical assessments are compared. DOE

N83-30815# Oxford Univ. (England). Engineering Lab.

BRITISH EXPERIENCE WITH THE SELF-BORING PRESSUREMETER

C. P. Wroth 1983 24 p refs Presented at Inst. Francais du Petrole Lab. des Ponts et Chaussees Symp. on Pressiometrie et ses Appl. en Mer
(OUEL-1450/83) Avail: NTIS HC A02/MF A01

The optimum position of the cutter of a soil pressuremeter is discussed and experience gained in geotechnical engineering applications are reviewed emphasizing the use of the instrument for the measurement of the shear modulus of the ground. The effects of the cutter position on the degree of disturbance of the ground being bored is analyzed, showing that an adjustment of the rotative cutter position relative to the sharp cutting edge of the cylindrical container minimizes ground disturbances. Use of the instrument in clay and sand soils is detailed. Measurements of the shear modulus together with the effective lateral stress are obtained for finite element computations in realistic models of soil behavior. Author (ESA)

N83-30816# Earthquake Engineering Research Inst., Berkeley, Calif.

BEHAVIOR OF SUBMERGED, MULTIPLE BODIES IN EARTHQUAKES

Wen-Gen Liao Sep. 1982 140 p refs Sponsored by NOAA
(PB83-158709; UCB/EERC-82/16) Avail: NTIS HC A07/MF A01 CSCL 13B

In order to investigate the nature of hydrodynamic interaction between two (or more) cylinders subjected to earthquake ground motion, a numerical analysis for determining the hydrodynamic forces on and the corresponding structural responses of a non-axisymmetrical offshore structure is presented. With the assumption of potential flow theory, a finite element method is developed to solve the boundary value problem in the fluid domain, which because of symmetry is reduced to one half. A localized finite element method utilizing eigenfunction expansions is also outlined in detail. If the cylinders have uniform cross sections, the three-dimensional problem can be reduced to a two-dimensional one and the computation becomes much more efficient. A computer program is developed to analyze the hydrodynamic forces and the structural responses according to the above mentioned analysis procedure, and illustrative examples are presented. Author (GRA)

N83-30817# Illinois Univ., Urbana-Champaign. Dept. of Civil Engineering.

RECYCLING OF BITUMINOUS SHOULDERS: MIXTURE AND ASPHALT EVALUATION Interim Report, 1980 - 1982

Samuel H. Carpenter Jun. 1982 73 p refs Sponsored by Illinois Dept. of Transporation and Federal Highway Administration
(PB83-146910; UILU-ENG-82-2010; FHWA/IL/UI-195) Avail: NTIS HC A04/MF A01 CSCL 13C

Recycled bituminous materials have proven economical when compared to the costs involved in constructing a pavement from all new materials. Long term performance comparisons have not been developed to illustrate the long term maintenance requirements. This report is the first of two reports detailing the examination of recycled mixes to predict long term performance. Two reclaimed pavements and two additional aged materials were selected. Procedures are developed for selecting the type and amount of recycling agent to minimize compatibility problems and not necessitate special handling problems. Author (GRA)

N83-30818# Massachusetts Dept. of Public Works, Wellesley Hills. Research and Materials Div.

MAYS METER DETERMINATION OF SERVICEABILITY RATINGS (SURFACE CHARACTERISTICS OF PAVEMENTS) Final Report, Mar. 1978 - Sep. 1982

Mathew D. Turo and Peter R. Magni Sep. 1982 21 p refs
(PB83-167064; R-27-02; FHWA-MA-82-04) Avail: NTIS

HC A02/MF A01 CSCL 13B

The Mays Ride Meter (M.R.M.) manufactured by RAinhart of Austin, Texas, was field tested to determine its operational characteristics. The roughness of a number of highway sections was measured using the M.R.M. The M.R.M. numbers were compared to subjective ratings given to these same highway sections by a panel of engineers. These values were correlated and a Roughness Evaluation Table was developed. GRA

N83-30819# Nicholson Construction Co., Bridgeville, Pa.
PERMANENT GROUND ANCHORS: NICHOLSON DESIGN CRITERIA Final Report, Jan. 1980 - Jan. 1981
P. J. Nicholson, D. D. Uranowski, and P. T. Wycliffe-Jones Sep. 1982 151 p
(Contract DTFH61-80-C-00016)
(PB83-167312; FHWA/RD-81-151) Avail: NTIS HC A08/MF A01 CSCL 13B

The methods used by Nicholson Construction Company in the design of permanent ground anchors specifically as related to retaining walls are discussed. Basic soil parameters, design concepts, drilling and grouting methods for ground anchors are discussed. Particular emphasis is placed on anchors founded in soil rather than rock formations. Also, soil properties necessary for the proper design of anchored retaining walls are detailed. The second chapter of the report is devoted to a general discussion of retaining wall and anchor design. In addition, a design example of an anchored retaining wall is presented in a step by step manner. GRA

N83-30820# Lin (T. Y.) International, San Francisco, Calif.
FEASIBILITY OF STANDARDS FOR SEGMENTAL PRESTRESSED CONCRETE BOX GIRDER BRIDGES Final Report, Sep. 1980 - Dec. 1981
F. Kulka, S. J. Thoman, and T. Y. Lin Jul. 1982 137 p refs
(Contract DTFH61-80-C-00144)
(PB83-169458; FHWA/RD-83-024) Avail: NTIS HC A07/MF A01 CSCL 13B

The feasibility of developing standard sections for segmental prestressed concrete box girder bridges. This type of bridge was introduced to America from Europe in the last fifteen years, and the projects completed to data attest to its viability in the American market as an economical solution for certain crossings. Since the present use in this field is limited in uniformity, standardization of the box girders could promise the consistency needed for wider use and greater cost effectiveness. An extensive survey was made of sedimental prestressed concrete box girder bridges in the United States and Canada, which permitted statistical studies to determine the uniformity of significant parameters, such as span-depth ratios, cross-sectional geometry and others. GRA

N83-30821# Purdue Univ., Lafayette, Ind. School of Civil Engineering.
SOME RECENT DEVELOPMENTS IN STRUCTURAL CONTROL
M. A. Basharkhah and J. T. P. Yao 1982 33 p refs
(Grant NSF CME-80-18963)
(PB83-169557; CE-STR-82-38; NSF/CEE-82077) Avail: NTIS HC A03/MF A01 CSCL 13B

To reduce the effect of lateral earthquake ground motion on structures, active control systems can be used. Many different approaches were applied to find a suitable gain matrix for the control law. Several investigations is summarized and reviewed. In addition, a technique on basis of the system identification methods is developed and presented. GRA

N83-30822# Maine Dept. of Transportation, Bangor. Materials and Research Div.
BRIDGE DECK REPAIRS WITH POLYMER CONCRETE PATCHING MATERIALS Final Report
Walter C. Edgecomb, Jr. Jan. 1983 85 p
(Contract DOT-FH-11-9212)
(PB83-171785; TP-82-9; FHWA-ME-TP-82-9) Avail: NTIS HC A05/MF A01 CSCL 13C

The FHWA polymer concrete as formulated at Brookhaven National laboratory (BNL) was mixed, placed into spalls and finished on grade with steel trowels on more than a dozen bridges. This polymer concrete was a two-component system consisting of a liquid monomer component comprised of methyl methacrylate base, which contained a cross linking agent with promoters and an inhibitor, and a powder component which contained reactive polymers, blend of silica sands, initiator, and color pigments. These formed an impregnable material of approximately 8000 psi. Cure time for this project's cold weather formulation to obtain this strength was approximately 2 hours at 40 F. Author (GRA)

N83-30823# Cornell Univ., Ithaca, N. Y.
COMPUTER-AIDED INJECTION MOLDING SYSTEM Final Report
K. K. Wang, S. F. Shen, C. Cohen, C. A. Hieber, and A. I. Isayev Oct. 1982 59 p refs
(Grant NSF DAR-78-18868)
(PB83-165282; NSF/MEA-82016) Avail: NTIS HC A04/MF A01 CSCL 13H

Achievements are reported in cavity-filling simulation, modeling viscoelastic effects, measuring and predicting frozen-in birefringence in molded parts, measuring residual stresses and associated mechanical properties of molded parts, and developing an interactive mold-assembly design program and an automatic NC maching data generation and verification program. The Cornell Injection Molding Program (CIMP) consortium is discussed as are computer user manuals that have been published by the consortium. Major tasks which should be addressed in future efforts are listed, including: (1) predict and experimentally determine the post-fillin behavior of thermoplastics; (2) simulate and experimentally investigate the injection molding of thermosets and filled materials; and (3) further investigate residual stresses, orientation and mechanical properties. GRA

N83-30824# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
HIERARCHICAL CONTROL SYSTEM EMULATION: APPLICATIONS GUIDE Final Report, Nov. 1981 - Oct. 1982
Timothy L. Johnson, Stephen D. Milligan, and Thomas E. Fortmann Oct. 1982 123 p refs
(Contract NB82-SBCA-0826)
(PB83-175075; NBS-GCR-82-410) Avail: NTIS HC A06/MF A01 CSCL 13H

The Hierarchical Control System Emulation is a collection of computer programs written in the high-level praxis language for use on a Digital Equipment Company VAX 11/780 processor under the VMS operating system. These programs allow the user to write, debug, and concurrently emulate modules of a hierarchical control system and to simulate the physical plant which is controlled. The emulation executes in real time and interactive display and data logging capabilities are included. The emulation is intended as a computer aided control system design tool for the NBS Automate Manufacturing Research Facility. The Applications Guide provides a case study of the Hierarchical Control System Emulation applied to an automated matching example, involving 14 modules. GRA

N83-30825# California Univ., Berkeley. Earthquake Engineering Research Center.
BEHAVIOR OF A PIPING SYSTEM UNDER SEISMIC EXCITATION. EXPERIMENTAL INVESTIGATIONS OF A SPATIAL PIPING SYSTEM SUPPORTED BY MECHANICAL SHOCK ARRESTORS AND STEEL ENERGY ABSORBING DEVICES
S. Schneider, H. M. Lee, and W. G. Godden May 1982 181 p refs Sponsored in part by the EPRI
(PB83-172544; UCB/EERC-82/03) Avail: NTIS HC A09/MF A01 CSCL 18I

A half scale model of a piping system from a nuclear reactor power plant was studied. The influence of the snubbers and of different energy absorbers on the dynamic response of the pipe system is discussed; a direct one-to-one replacement of the snubbers by energy absorbers allows a direct comparison of the results. In energy absorbers, the effect of a thermal loading was simulated by a deforming system at the restriners, and the seismic

loading was superimposed on this biased configuration. Test runs were recorded using four different artificial earthquakes and sinusoidal input. Damping behavior, frequency spectra and hysteresis loops for both shock arrestors and energy absorbers is studied. GRA

N83-30826# National Bureau of Standards, Washington, D.C. National Engineering Lab.
THERMAL COMFORT CONDITIONS IN THE NBS/DoE DIRECT GAIN PASSIVE SOLAR TEST FACILITY
Stanley T. Liu Dec. 1982 50 p refs
(Contract DE-AI01-76PR-06010)
(PB83-162032; NBSIR-82-2621) Avail: NTIS HC A03/MF A01 CSCL 13A

The thermal comfort conditions in a direct gain cell of passive solar test facility were analyzed. It was found that the daytime operative temperature as measured by the black globe temperature sensors in an area near the large south glazing exceeded the upper boundary of the ASHRAE comfort envelope by a large amount in a clear day during both the thermal transition month of October and the cold winter month of January. The reflected solar radiation from the interior surfaces and the snow covered ground plays a significant role on the measured black globe temperature and should be included in the computation of the mean radiant temperature for a space with large glazed areas. GRA

N83-30827# Connecticut Dept. of Transportation, Wethersfield.
PASSIVE SOLAR-HEATING RETROFIT OF A MAINTENANCE FACILITY: FIRST-YEAR PERFORMANCE Research Report, May 1981 - Jun. 1982
David R. Jackson and John Michael Callahan Sep. 1982 95 p refs
(PB83-171009; FHWA-CT-724-2-82-10) Avail: NTIS HC A05/MF A01 CSCL 13A

A 12,000 sf maintenance facility in Connecticut was retrofitted with a 1,500 sf passive solar Trombe wall, 2 in. of foam roof insulation and a new control system that allows night/weekend temperature setback. A new separate boiler was installed to heat an office/locker wing of the facility. An energy-consumption monitoring system was installed and collected data for 11/2 years before the retrofit and one complete year after the retrofit. Actual energy consumption for the facility was very close to that predicted using simple analytic methods. After the solar wall was installed and other energy-conservation measures implemented the yearly oil consumption was reduced to 2744 gallons/year. GRA

N83-30828# Soletanche and Rodio, Inc., McLean, Va.
PERMANENT GROUND ANCHORS: SOLETANCHE DESIGN CRITERIA Final Report, Jan. - Jul. 1981
P. Pfister, G. Evers, M. Guillaud, and R. Davidson Sep. 1982 209 p refs
(Contract DTFH61-80-C-00012)
(PB-83165993; FHWA/RD-81/150) Avail: NTIS HC A10/MF A01 CSCL 13B

The design criteria used by Soletanche for permanent ground anchors, particularly in its most advanced form, the IRP anchor, which can be regrouted after installation is complete, if necessary to improve its capabilities is defined and explained. Details are given for various types of anchor load and proof testing. The Soletanche design procedure, using computer programs to optimize ground anchor support system, is explained in detail, using actual printouts of these computer programs, as used for a sample problem. GRA

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N83-30829 British Broadcasting Corp., Kingswood (England). Engineering Div.
MEDIUM FREQUENCY PROPAGATION: A SURVEY
P. Knight Apr. 1983 19 p refs
(BBC-RD-1983/5) Avail: BBC, Kingswood Warren, Tadsworth, Surrey, England

At medium frequencies, ground waves and sky waves are both of equal importance. Ground waves provide stable signals during the day, when sky waves are weak. At night sky waves propagate to considerable distances with very little attenuation but are more variable. Published ground-wave propagation curves apply to land which is smooth and of uniform conductivity, but this condition is rarely satisfied in practice. The report describes methods for calculating field strengths along mixed land-sea paths, over irregular terrain and through built-up areas. An interesting feature of sky-wave propagation arises because the Earth's gyromagnetic frequency lies within the frequency band being considered. This gives rise to polarization coupling loss, which is of considerable importance in tropical regions and to further coupling loss between hops on multi-hop paths. Enhanced inospheric cross-modulation also occurs at the gyromagnetic frequency. Author

N83-30830 British Broadcasting Corp., Kingswood (England). Engineering Div.
DIGITAL VIDEO BIT RATE REDUCTION: BLANKING ELIMINATION FOR SUB-NYQUIST (2f SUB SC) PAL
R. P. Marsden Jun. 1983 18 p refs
(BBC-RD-1983/6) Avail: BBC, Kingswood Warren, Tadsworth, Surrey, England

British Telecom is converting its communications network to digital operation, and the analogue circuits will eventually disappear. Although video signals can easily be converted to digital form, the bit rate occupied by a conventional pulse-code modulation (p.c.m.) video signal is high. Economies in the use of circuits could be made by reducing this bit rate. The elimination of blanking intervals from the digitized signal, which is one of several techniques investigated as a means of reducing bit rates is discussed. It is concluded that blanking elimination, although possible, is unattractive for PAL-code signals because of the complexity of the equipment. However, for signals that are more tightly defined, for example those complying with the CCIR recommendations for the digital coding of component video signals, blanking elimination would be a straightforward process that could be used with confidence to provide a valuable saving of bit rate with no impairment to picture quality. Autho

N83-30831 Forschungsinstitut fuer Hochfrequenzphysik, Werthoven (West Germany).
PROPOSAL FOR A ROBUST MULTISTATIC DETECTION STRATEGY
Dietrich Baumgarten Sep. 1982 38 p refs In GERMAN; ENGLISH summary
(Contract BMVg-T/RF-31/71435/71340)
(Rept-8-82; Lfd-8-82) Avail: Issuing Activity

A binomial multistatic detection strategy called the 1-out-of-N-detector is introduced. Detection is announced if at least one of the possible N receivers observes a local threshold crossing. The main advantages of the proposed concept are computational ease, narrow communication bandwidth, and satisfactory operation if terrain masking occurs. Compared to the optimum multistatic architecture these advantages outweigh relatively small degradation of receiver performance. Author (ESA)

N83-30832*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

METHOD FOR TERMINAL POSITION DETERMINATION IN EARTH TERMINAL-TO-SATELLITE BURST ACQUISITION AND SYNCHRONIZATION Patent Application
Robert E. Hay and Donald J. Sabourin, inventors (to NASA) Filed 11 Jun. 1982 24 p
(NASA-Case-LEW-13893-1; US-Patent-Appl-SN-387622) Avail: NTIS HC A02/MF A01 CSCL 17B

A method is presented for determining positions of Earth stations in a satellite switched time-division multiple access communication system having a means for measuring transmission delays. The position of the Earth terminal is triangulated using transmission delay data obtained from message alignment at three or more positions in a satellite's orbit for which coordinates are known. NASA

N83-30833# Junta de Energia Nuclear, Sacavem (Portugal). Div. de Metrologia.
RECOMMENDED VALUES OF THE HUMIDITY CORRECTION FACTOR Kh FOR DETERMINING EXPOSURE WITH CAVITY CHAMBERS AT 60 Co ENERGIES
J. M. Losarcosmerino and A. Brosedserreta 1983 119 p refs In SPANISH; ENGLISH summary
(JEN-534) Avail: NTIS HC A06/MF A01

The meaning of the humidity correction factor k sub h, required for determining the exposure for Co-60 photons, with cavity chambers, is explained. Experimental values of k sub h are commented on a method for estimating k sub h numerically at any particular conditions of relative humidity, pressure and temperature is indicated. A table of k sub h calculated for relative humidity varying from 0% to 90%, for pressures in the range of 70 kPa to 104 kPa and temperatures between 15 C and 30 C, is included. S.L.

N83-30834# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
COMMUNICATION INTERFACE MODEL USING MULTIMICRO PROCESSING [MODELO DE UMA INTERFACE DE COMUNICACAO UTILIZANDO MULTIMICROPROCESSAMENTO]
Mauro Hissao Hashioka May 1983 24 p refs In PORTUGUESE; ENGLISH summary
(INPE-2733-RPE/432) Avail: NTIS HC A02/MF A01

A model of communication interface to be applied in data communication networks is presented. It is based on the simultaneous utilization of multiple microprocessors, with an architecture configured for distributed processing. Author

N83-30835*# National Aeronautics and Space Administration, Washington, D. C.
ON THE THEORY OF SELF-FOCUSING OF POWERFUL WAVE BEAMS IN NONHOMOGENEOUS MEDIA
N. S. Yerokhin and A. P. Fadeyev May 1983 44 p refs Transl. into ENGLISH of "K Teorii Samofokusirovki Moshchnykh Volnovykh Puchkov v Neodnorodnykh Sredakh" Preprint 128 Moscow, 1982 p 1-38 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77223; NAS 1.15:77223) Avail: NTIS HC A03/MF A01 CSCL 20N

The stationary self-focusing of the Gauss wave beam is considered in a nonhomogeneous medium in the case of local nonlinearity. Equations of the aberrationless approximation for the beam width, the field on the beam axis and the refraction factor are integrated on a computer. Self-focusing in dependence of the nonlinearity level and initial divergence, the dissipation, the length of nonhomogeneity of the dielectric permittivity nondisturbed by a beam, and the diffraction parameter are investigated. Author

N83-30836# Mission Research Corp., Santa Barbara, Calif.
TECHNIQUES FOR SOURCE-REGION EMP EXPERIMENTS AT AURORA
V. A. J. vanLint and William Scharf Feb. 1983 34 p refs
(Contract DAAK21-80-R-9072; DA Proj. 1L1-62120-AH-25)
(AD-A127379; HDL-CR-83-072-1; AURORA-EMP-MEMO-22) Avail: NTIS HC A03/MF A01 CSCL 20/14

This memo describes reliable measurement techniques for determining source-region EMP parameters in the AURORA room. The general principles involved in each measurement, the interference effects, and specific design considerations for the AURORA environment are discussed. These measurements include the determination of the electromagnetic fields, the current densities, the air conductivity and the induced currents on a conductor. The interference effects, as they relate to each of these measurements, occurring from Compton transfer currents, ionization-induced conduction, shield currents and photo-induced cable currents are also discussed. Author (GRA)

N83-30837# Ohio State Univ., Columbus.
ADAPTIVE ARRAY BEHAVIOR WITH PERIODIC ENVELOPE MODULATED INTERFERENCE
A. S. Al-Ruwais and R. T. Compton, Jr. Dec. 1982 38 p refs
(Contract N00019-82-C-0190)
(AD-A127245; ESL-714505-1) Avail: NTIS HC A03/MF A01 CSCL 09/5

The authors present a method for determining the effects of envelope modulated interference on an LMS (least mean square) adaptive array. The interference is assumed to have periodic envelope modulation with a bandwidth small compared to the carrier frequency. For such interference, the method allows one to calculate the periodic steady-state behavior of the array weights and the resulting array performance. As an example, computed are the effects of an ordinary amplitude modulated (AM) interference signal on the array. It is shown that such interference causes the array to modulate the desired signal envelope but not its phase. With a DPSK desired signal, AM interference is found to have about the same effect on bit error probability as CW interference. Author (GRA)

N83-30838# Naval Research Lab., Washington, D. C.
RADIATION PATTERNS OF A DUAL REFLECTOR SYSTEM BASED ON THE GEOMETRICAL OPTICS APPROXIMATION
J. K. Hsiao 3 May 1983 27 p
(RR0210543)
(AD-A127232; NRL-MR-5049) Avail: NTIS HC A03/MF A01 CSCL 09/5

In this report the two-dimensional radiation patterns of an array-fed dual reflector system are computed and presented. For the purpose of preliminary study of the feasibility of this system, the pattern is computed by means of an approximate geometrical-option method. Results show that the radiation patterns of this system are well behaved, exhibiting no difficulty in beam steering. They also show that a modest sidelobe level can be achieved (30 dB or better). For better pattern synthesis and optimum array spacing, however, further work is required. Author (GRA)

N83-30839# Naval Postgraduate School, Monterey, Calif.
THE EFFECT OF FEEDBACK TO USERS OF VOICE RECOGNITION EQUIPMENT
Gary K. Poock, B. Jay Martin, and Ellen F. Roland Feb. 1983 42 p refs
(Contract MIPR-TB-024)
(AD-A127223; NPS55-83-003) Avail: NTIS HC A03/MF A01 CSCL 17/2

This paper describes an experiment designed to study the effect of providing a user of VOICE recognition equipment, with feedback concerning how well the voice recognizer is interpreting the user's voice commands. GRA

N83-30840# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
MULTIACCESS PROTOCOLS FOR VARIABLE LENGTH PACKETS M.S. Thesis
Jacek Jachner Mar. 1983 38 p refs
(Contract N00014-75-C-1183; ARPA Order 3045; NR Proj. 049-383)
(AD-A12689988; LIDS-TH-1286) Avail: NTIS HC A03/MF A01 CSCL 17/2

The formulation of the decision making process of a failure detection algorithm as a Bayes sequential decision problem provides a simple conceptualization of the decision rule design problem. As the optimal Bayes rule is not computable, a methodology that is based on the Bayesian approach and aimed at a reduced computational requirement is developed for disigning suboptimal rules. A numerical algorithm is constructed to facilitate the design and performance evaluation of these suboptimal rules. The result of applying this design methodology to an example shows that this approach is potentially a useful one. GRA

N83-30841# Lincoln Lab., Mass. Inst. of Tech., Lexington.
PACKET SPEECH SYSTEMS TECHNOLOGY Semiannual Technical Summary Report, 1 Apr. - 30 Sep. 1982
Clifford J. Weinstein and Peter E. Blankenship 30 Sep. 1982 47 p refs
(Contract F19628-80-C-0002; AF Proj. 2D10; AF Proj. 2T10; ARPA Order 3673)
(AD-A126880; ESD-TR-82-155) Avail: NTIS HC A03/MF A01 CSCL 17/2

The long-range objectives of the Packet Speech Systems Technology Program are to develop and demonstrate techniques for efficient digital speech communications on networks suitable for both voice and data, and to investigate and develop techniques for integrated voice and data communication in packetized networks, including wideband common-user satellite links. Specific areas of concern are: the concentration of statistically fluctuating volumes of voice traffic, the adaptation of communication strategies to varying conditions of network links and traffic volume, and the interconnection of wideband satellite networks to terrestrial systems. Previous efforts in this area have led to new vocoder structures for improved narrowband voice performance and multiple-rate transmission, and to demonstrations of conversational speech and conferencing on the ARPANET and the Atlantic Packet Satellite Network. The current program has two major thrusts: i.e., the development and refinement of practical low-cost, robust, narrowband, and variable-rate speech algorithms and voice terminal structures; and the establishment of an experimental wideband satellite network to serve as a unique facility for the realistic investigation of voice/data networking strategies. GRA

N83-30842# Naval Postgraduate School, Monterey, Calif. Dept. of Electrical Engineering.
AIRCRAFT STATE ESTIMATION FOR A GROUND DIRECTED BOMBING SYSTEM M.S. Thesis
John A. Jauregui Dec. 1982 97 p refs
(AD-A126878) Avail: NTIS HC A05/MF A01 CSCL 17/9

The performance of a modified linear Kalman filter with adaptation is compared with that of a common adaptive alpha-beta filter for state estimation of a pilot controlled, ground directed bombing system. Of particular concern, is the accuracy and response of the alternative filters when the aircraft conducts random maneuvers in the vicinity of the target. The desirability of including deterministic forcing in the filter model is discussed and a technique utilizing an adaptive Kalman identifier to establish the pilot response to ground control heading commands is presented. Author (GRA)

N83-30843# Pennsylvania Univ., Philadelphia. School of Electrical Engineering.
HIGH ANGULAR RESOLUTION MICROWAVE SENSING WITH LARGE, SPARSE, RANDOM ARRAYS Annual Technical Report, 1 Oct. 1981 - 30 Sep. 1982
C. Nelson Dorny and Bernard D. Steinberg Dec. 1982 48 p refs
(Grant AF-AFOSR-0012-82; AF Proj. 2305)
(AD-A126866; AFOSR-83-0225TR; UP-VFRC-29-82) Avail: NTIS HC A03/MF A01 CSCL 17/9

This document describes progress toward development of a general capability for high resolution microwave surveillance and imaging using large, sparse, self-cohering arrays. During the last year progress has been made in unification of self-cohering techniques, and in development of techniques for reducing the effects of the high sidelobes associated with sparse arrays. Author (GRA)

N83-30844# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
STATE STANDARDS OF THE USSR
2 Mar. 1983 35 p Transl. into ENGLISH of Gos. Obshchesoyuznyy Standarts 5.1042.71 and 5.1043.71 p 1-14; 1-13
(AD-A12985; FTD-ID(RS)T-1792-82) Avail: NTIS HC A03/MF A01 CSCL 17/2

Quality requirements for transmitting and receiving facsimile apparatus are defined. The devices are designed for the transmission and reception of weather charts and forecasts, text material, and black and white images on short wave and ultrashort wave telephone channels. M.G.

N83-30845# Southern Methodist Univ., Dallas, Tex. Dept. of Electrical Engineering.
SPREAD SPECTRUM MOBILE RADIO COMMUNICATIONS Final Report, 1 Feb. 1981 - 31 Aug. 1982
S. C. Gupta 31 Dec. 1982 102 p refs Presented at the Intern. Commun. Conf.
(Grant AF-AFOSR-3277-77; AF Proj. 2305)
(AD-A127266; AFOSR-83-0246TR) Avail: NTIS HC A06/MF A01 CSCL 17/2

In this report, we analyze the performance of frequency-hopped spread-spectrum systems under mobile radio channel conditions. Because of its good spectrum-efficiency, frequency-hopped systems seen to be natural candidates for mobile telephony in the near future. We analyze mainly the Frequency-Hopped-Multilevel Frequency Shift-Keyed (FH-MFSK) System, the reason being the established superiority of FH-MFSK over the other modulation, namely the Frequency-Hopped Differential Phase Shift Keyed system (FH-DPSK), under identical conditions. Our new results include the spectrum efficiency analysis of FH-MFSK for various bandwidths of interest, the performance analysis of FH-MFSK under the influence of log-normal shadowing and Rayleigh fading, the possible performance improvement with the inclusion of a small number of space-diversity branches to combat the losses due to fading, a preliminary analysis of the occurrence of burst errors in FH systems, the amount of degradation due to the users operating in the adjacent cells and a possible power control scheme to mitigate these effects and finally a result which establishes the near-equivalent performance of the hard-limited and the likelihood receivers under Rayleigh fading and multi-user interference conditions. GRA

N83-30846# Ohio State Univ., Columbus. Electroscience Lab.
ADVANCED ADAPTIVE ANTENNA TECHNIQUES Quarterly Report
R. T. Compton, Jr. Jan. 1983 7 p refs
(Contract N00019-82-C-0190)
(AD-A127257; ESL-714505-2) Avail: NTIS HC A02/MF A01 CSCL 09/5

This report describes progress under Naval Air Systems Command Contract N00019-82-C-0190 during the first quarterly period. Research on the behavior of adaptive arrays with frequency-hopped signals is summarized. Author (GRA)

N83-30847# Naval Postgraduate School, Monterey, Calif. Dept. of Administrative Sciences.
WORD PROCESSING AT THE NAVAL POSTGRADUATE SCHOOL M.S. Thesis
Richard E. Brooks and Gerard B. Baigis Dec. 1982 127 p refs
(AD-A127217) Avail: NTIS HC A07/MF A01 CSCL 05/9

The purpose of this study is to explore the productivity aspect of word processing. An examination of selected productivity studies is presented with a look at the costs and benefits associated with the use of word processing equipment versus conventional electric typewriters. An examination of the science of ergonomics is presented as it deals with the physical and mental aspects of word processing equipment and its affects on the word processing equipment operator. The results of a survey of word processing

equipment operators attitudes towards their job at the Naval Postgraduate School are presented along with conclusions and recommendations concerning the implementation of a humane and productive system. GRA

N83-30848# Naval Postgraduate School, Monterey, Calif. Dept. of Administrative Sciences.
LOCAL AREA NETWORK TERMINAL MANAGEMENT IN SUPPORT OF STOCK POINT LOGISTICS INTEGRATED COMMUNICATIONS ENVIRONMENT (SPLICE) M.S. Thesis
Jerry D. Barnes Dec. 1982 41 p refs
(AD-A127166) Avail: NTIS HC A03/MF A01 CSCL 17/2

This thesis examines the questions of user requirements, design considerations, and network environment for a local area network Terminal Management function in support of the Naval Supply Systems Command's Stock Point Logistics Integrated Communications Environment (SPLICE). Criteria are developed from this examination. These include process-process communication, virtual terminal, and user defined screen capabilities as well as a negotiated virtual terminal protocol based upon a network virtual terminal concept. Recommended generic and specific of the Terminal Management function applying these criteria are then presented. GRA

N83-30849# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. Dept. of Electrical Engineering.
DIGITAL CORRELATION OF SPREAD SPECTRUM SIGNALS VIA FREQUENCY DOMAIN PROCESSING M.S. Thesis
Joseph A. Carretto, Jr. Jul. 1982 70 p refs
(AD-A127434; AFIT/GE/EE/82S-15) Avail: NTIS HC A04/MF A01 CSCL 17/2

Background information on the theory behind processing spread-spectrum synchronization data in the frequency domain is presented. The derivation shows that the time domain pseudo-noise sequence offset is represented in the frequency domain by frequency modulation on a known carrier wave. Following the background development is a detailed description of the analog hardware used to implement the frequency domain processing techniques. A proposed method of digitally extracting the synchronization data by Fourier transforming the analog output signal is presented. The digital processor designed and built to sample, average, and calculate a Fast Fourier Transform of the analog data is described in detail. Results obtained from both the analog and digital hardware are discussed, comparing the actual results to those predicted for various inputs. The results validate the processing concepts, and indicate areas for further research. Author (GRA)

N83-30850# Naval Research Lab., Washington, D. C. Target Characteristics Branch.
PARAMETER ESTIMATION AND TARGET DETECTION IN A DISTRIBUTED-CLUTTER ENVIRONMENT Interim Report
Feng-Ling C. Lin, Bernard L. Lewis, and Frank F. Kretschmer, Jr. 23 Mar. 1983 12 p refs
(SF12131691)
(AD-A127420; NRL-8681) Avail: NTIS HC A02/MF A01 CSCL 17/9

A requirement for the simultaneous measurement of range and velocity of a radar target (parameter estimation) can be satisfied by using a waveform with a thumbtack-type ambiguity diagram and implementing a bank of matched filters in the absence of distributed clutter. It is demonstrated here that this technique cannot be applied in a distributed-clutter environment, because it provides no subclutter visibility for detecting targets. To eliminate nonmoving clutter, a moving-target-indicator (MTI) delay-line canceler must be used on all Doppler-filter outputs. This scheme suffers from blind-speed problems and prevents parameter estimation with a single pulse. To data no known technique based on a single pulse can achieve parameter estimation in distributed clutter. It is shown that in such an environment, with two or more pulses an MTI system using equal and oppositely range-Doppler-coupled waveforms not only simplifies the required hardware with no blind-speed problem but also provides subclutter and accomplishes accurate parameter estimation simultaneously. Author (GRA)

N83-30851# Los Alamos Scientific Lab., N. Mex.
SOME NON-LINEAR ESTIMATES FOR LATERAL PROPAGATION OF SELF-GENERATED B FIELDS
S. R. Goldman 1982 10 p refs Presented at the CECAM Workshop, Paris, 13 Sep. - 1 Oct. 1982
(Contract W-7405-eng-36)
(DE83-007576; LA-UR-83-291; CONF-8209113-1) Avail: NTIS HC A02/MF A01

Nonlinear estimates which provide plausible guidelines and scalings for the lateral transport of magnetic fields due to laser plasma interaction in both slab and cylindrical geometries are presented. Limitations of the modelling are also indicated. DOE

N83-30852# Technische Hogeschool, Delft (Netherlands).
PULSED ELECTROMAGNETIC RADIATION FROM A LINE SOURCE IN THE PRESENCE OF A SEMI-INFINITE SCREEN IN THE PLANE INTERFACE OF TWO DIFFERENT MEDIA
R. deCloux Aug. 1982 110 p refs
(PB83-164889; Rept-1982-08) Avail: NTIS HC A06/MF A01 CSCL 20N

The diffraction of a pulsed electromagnetic wave by a semi-infinite screen located in the interface of two different media is investigated theoretically. The incident electromagnetic field, generated by a line source, is decomposed into its plane wave constituents, after which the diffraction problem is solved for each plane wave constituent separately. The Wiener-Hopf technique is used to solve a pair of dual integral equations. Special attention is given to the numerical evaluation of the factorization problem; also an approximate factorization method is discussed. The modified Cagniard technique is used to derive closed form expressions for the field components anywhere in the configuration. Numerical results, for points of observation near the edge of the screen, are presented in a number of illustrate cases for different positions of the source and different contrasts of the two media. GRA

N83-30853# Fondazione Ugo Bordoni, Rome (Italy).
FLOW CONTROL IN POINT TO POINT PACKET SWITCHED NETWORKS [UN CONTROLLO DI FLUSSO IN RETI PUNTO-PUNTO A COMMUTAZIONE DI PACCHETTO]
Davide Grillo Jul. 1982 13 p refs In ITALIAN Presented at 30th Congr. Intern. Delle Comunicazioni, Genoa, 12-15 Oct. 1982 Revised
(FUB-13-1982-Rev) Avail: NTIS HC A02/MF A01

A flow control procedure for packet switched networks is presented. The control is based on differentiating the access to node memory for external and internal packets (packets already processed by another node). External packets can acceed to network nodes only if a memory capacity fraction is available, while the internal packets have unlimited access and are transmitted back only if memory is totally occupied. It is shown that this memory dynamic reserve considerably reduces the costly retransmission backwards of internal packets and the procedure becomes equivalent to an external network recovery of rejected internal packets. Author (ESA)

N83-30854# Fondazione Ugo Bordoni, Rome (Italy).
A TECHNIQUE FOR IMPROVING DEPOLARIZATION MEASUREMENTS BEYOND 10 GHz: TILTING THE POLARIZATION PLANES
Dario Maggiori, Pier Giorgio Migliorini, and Aldo Paraboni (Politecnico di Milano) Nov. 1982 16 p refs
(FUB-25-1982) Avail: NTIS HC A02/MF A01

It is shown that tilting the polarization planes by 25 deg with respect to the vertical/horizontal in linear polarization systems allows a substantial improvement in the accuracy and measuring range of experimental configurations measuring canting angle and anisotropy of the depolarizing medium. For incoherent detection, the sign of the canting angle is detectable. Author (ESA)

N83-30855# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).
MEASUREMENTS OF RADIOACTIVITY ON COMMUNICATION EQUIPMENT AT 573 VERZANELPLAATS, HENDRIK-IDO-AMBACHT
J. B. Th. Aten, A. L. M. Roods, and K. M. Wimmers 1982 19 p In DUTCH; ENGLISH summary
(Contract A76/K/099)
(MBL-1982-12; TDCK-77124) Avail: NTIS HC A02/MF A01

The radioactivity of communication equipment with radium-containing paint was checked. Relative measurements were performed in situ, and apparatus was calibrated in the laboratory. Radioactive paint is present on needles and indication panels of measuring instruments. Equipment which is above or below the limit for which a license is required according to the Dutch nuclear energy act is indicated. Author (ESA)

N83-30856# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abteilung HF-Verfahren.
THEORY OF OBSERVATION OF EARTH BY MULTIPLE-FREQUENCY RADAR
Emil Sappl Sep. 1982 65 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-819)
(DFVLR-FB-82-31; ESA-TT-819) Avail: NTIS HC A04/MF A01; DFVLR; Cologne DM 22,50

The multiple frequency radar backscattering of the Earth surface is described by a generalized backscattering coefficient. The measurement of that coefficient is discussed for a homogeneously and stationarily scattering surface, and for any given surface, including the case of the observation of the sea surface by a dual frequency radar. The precision of a CW radar with a narrow, bell shaped field pattern is investigated by the signal to noise ratio. The sensitivity limit of a multiple frequency radar for Earth observation is specified. Author (ESA)

N83-30857# Royal Military Coll. of Science, Shrivenham (England). Dept. of Physics.
PLASTICS IN BATTERIES
P. J. Fydelor and K. V. Lovell 1982 22 p refs Presented at Inst. of Elec. Engr. Intern. Conf. on Plastics in Telecommun., 15-17 Sep. 1982
(TN-PD/30/82) Avail: NTIS HC A02/MF A01

The use of plastics in rechargeable cells is reviewed. Cell cases, electrodes, electrode spacers, separators and absorbers and electrolytes are discussed. Related aspects of polymer technology are summarized, and trends are outlined. Although the use of plastics improves electrochemical efficiency and service life, traditional batteries remain first choice for many users for stationary batteries. Author (ESA)

N83-30858# Kiruna Geophysical Inst. (Sweden).
EMISSION OF MYRIAMETRIC RADIATION BY COALESCENCE OF UPPER HYBRID WAVES WITH LOW-FREQUENCY WAVES
Kjell Roennmark Nov. 1982 29 p refs
(PB83-165647; KGI/PREPRINT-059; ISSN-0349-2656) Avail: NTIS HC A03/MF A01 CSCL 20N

Numerical analysis of the dispersion relations of waves, propagating perpendicular to the magnetic field in a plasma typical of the plasmapause region, shows that the resonance conditions for coalescence of upper hybrid waves with high harmonic ion Bernstein waves into electromagnetic radiation can be satisfied. The power radiated by this process is calculated and predictions are made about the direction, polarization, and frequency spectrum of the emitted waves. GRA

N83-30859# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
IMPROVED ESTIMATES OF HF RADIOWAVE FIELD STRENGTH NEAR A LAND-SEA INTERFACE
R. M. Jones Nov. 1982 58 p refs
(PB83-165332; NOAA-TM-ERL-WPL-105; NOAA-83012606) Avail: NTIS HC A04/MF A01 CSCL 20N

Results of other researchers are extended to give the detailed behavior of mixed-path (land-sea or sea-land) propagation near the land-sea interface. It is shown that the mechanism for groundwave-mode coupling at the land-sea interface is edge-diffraction, and that near the shoreline the direct edge-diffracted wave can make a significant contribution to the field. It is further argued that, for sea-to-land propagation for an elevated observer, the sea-type groundwave modes extend over land, and there is a shadow zone for the land-type groundwave modes excited at the shoreline. Corresponding results hold for land-to-sea propagation. GRA

N83-30860# Institute for Telecommunication Sciences, Boulder, Colo.
INVESTIGATION OF HF (HIGH FREQUENCY) PROPAGATION CONDITIONS ASSOCIATED WITH THE THIRD HIGH ENERGY ASTROPHYSICAL OBSERVATORY LAUNCH
David B. Sarrazin Nov. 1982 31 p refs
(PB83-161737; NTIA/Rept-82-109) Avail: NTIS HC A03/MF A01 CSCL 20N

The burning of an Atlas-Centaur rocket in the ionospheric F region was used to determine the extent of HF propagation anomalies associated with the resultant drop in total electron content. This ionospheric hole grew to encompass the control points of many Caribbean of North American high frequency (HF) paths soon after the 0528 GMT launch from Kennedy Space Center, Cape Canaveral, Florida (28.40 degrees N, 80.60 degrees W) on September 20, 1979. Short wave listeners, who collectively monitored 86 paths after launch, volunteered signal strength and fade quality data concerning special broadcasts on 15295 kHz from Bonaire (12.25 degrees N, 68.45 degrees W) and on 17815 kHz from Antigua (17.15 degrees N, 61.82 degrees W). GRA

N83-30861# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
AUTOMATIC GAIN CONTROL FOR AN HF DOPPLER RADAR RECEIVER
J. D. Forberg and B. L. Weber Nov. 1982 33 p refs
(PB83-165126; NOAA-TM-ERL-WPL-104; NOAA-83012605) Avail: NTIS HC A03/MF A01 CSCL 17I

In an HF Doppler radar system to remotely measure surface currents and waves on the ocean. One important hardware component is the HF receiver, which must have a large dynamic range of sensitivity. The automatic gain control (AGC) algorithm which is used to adjust that sensitivity is discussed. GRA

N83-30862# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
MODERN HF COMMUNICATIONS
Loughton, England May 1983 177 p refs Lecture series presented at Athens, 30-31 May 1983, Rome, 2-3 Jun. 1983 and Fort Monmouth, N.J., 14-15 Jun. 1983
(AGARD-LS-127; ISBN-92-835-1450-5) Avail: NTIS HC A09/MF A01

Real time channel evaluation; system design; and advances in equipment, in propagation, and in coding and modulation techniques are discussed. For individual titles, see N83-30863 through N83-30872.

N83-30863# York Univ. (England). Dept. of Electronics.
HF SYSTEM DESIGN PRINCIPLES
M. Darnell *In* AGARD Modern HF Commun. May 1983 15 p refs (For primary document see N83-30862 19-32)
Avail: NTIS HC A09/MF A01

The general principles of HF communication system design, using as a framework a generalized communication system comprising: propagation path, information source and sink, source encoder/decoder, channel encoder/decoder, and RF equipment. The basic properties of the medium relevant to the design, control and operation of HF systems are considered. In particular, the problems of HF system control are examined in depth. Author

N83-30864# Norwegian Defence Research Establishment, Kjeller.
PROPAGATION 1. STATE OF THE ART OF MODELLING AND PREDICTION IN HF PROPAGATION
E. V. Thrane *In* AGARD Modern HF Commun. May 1983 21 p refs (For primary document see N83-30862 19-32)
Avail: NTIS HC A09/MF A01

The lecture reviews the state of the art in HF propagation modelling and describes the principles of radio frequency predictions. As a basis for the discussions, a brief introduction is given to the ionospheric parameters of importance to HF-propagation. Current methods for frequency prediction are semi-empirical, that is they depend upon a large data base of ionospheric physical models of the ionosphere and of radio wave propagation through the medium. In addition models of the noise and interference environment must be included. The lecture discusses the principles on which the methods are based, as well as their limitations. Examples are given of the use of predictions in system planning and communications. The relative importance of skywave and ground wave communications in the HF-band is discussed. Author

N83-30865# York Univ. (England). Dept. of Electronics.
REAL-TIME CHANNEL EVALUATION
M. Darnell *In* AGARD Modern HF Commun. May 1983 20 p refs (For primary document see N83-30862 19-32)
Avail: NTIS HC A09/MF A01

The requirement for real-time channel evaluation (RTCE) in HF systems is identified and discussed in detail. Various scenarios in which RTCE is applicable are examined and classified. Specific RTCE techniques and systems are then described including: Pulse/modulated pulse sounding, chirp sounding, limited channel monitoring, interference characterization, and in-band RTCE. The application of RTCE to practical HF systems is discussed and the benefits accruing from its use quantified. Author

N83-30866# Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass.
INTRODUCTION TO CODING FOR HF COMMUNICATIONS
Mario D. Grossi *In* AGARD Modern HF Commun. May 1983 13 p refs (For primary document see N83-30862 19-32)
Avail: NTIS HC A09/MF A01

The increasing demand for reliable, low error-rate, high-speed digital data transmission at HF has created the need for the adoption of coding schemes. As it is well appreciated by the practicing communicator, a problem in high-speed data transmission is the occurrence of errors. Codes provide an effective approach for the reduction of the error rate. Linear block codes (of which cyclic codes are a subclass) and convolutional codes are the main categories of codes of interest to HF communications. They are capable of correcting random errors due to white Gaussian noise, as well as burst errors due to impulse noise. In block codes, a block of information bits is followed immediately by a group of check bits. The latter verify the presence of errors in the former. In convolutional codes, check bits are continuously interleaved with information bits, and they check the presence of errors not only in the block immediately preceeding them, but in other blocks as well. For the various coding schemes reviewed in the lecture, several numerical examples are given, to help in the quantitative appraisal of the merits of a code, versus required equipment complexity. Author

N83-30867# Signatron, Inc., Lexington, Mass.
MODERN HF COMMUNICATIONS, MODULATION AND CODING
P. Monsen *In* AGARD Modern HF Commun. May 1983 13 p refs (For primary document see N83-30862 19-32)
Avail: NTIS HC A09/MF A01

Digital communications over High Frequency radio channels are limited by the effects of time varying multipath signals and an impulsive noise characteristic. Modulation techniques which utilize adaptive receiver structures in conjunction with advanced error correction coding concepts can provide quality communication at both low data rates around 10 bps and high data rates around 2400 bps. The multipath channel is examined and two basic constraints are introduced. When the learning constraint is satisfied, it is possible to estimate the channel multipath gain and phase components. The diversity constraint establishes the necessary condition for implicit diversity. For low data rate applications where Intersymbol Interference (ISI) is negligible, adaptive receivers are discussed when both learning and diversity constraints are satisfied. An incoherent adaptive receiver is discussed for applications where the learning constraint is not satisfied. For high data rate applications, both constraints are satisfied in an HF application but ISI effects are severe. Adaptive techniques including equalizers and maximum likelihood sequence estimators are discussed. Experimental results from HF channel simulator tests are presented in a comparison of nonadaptive and adaptive high speed modems. We discuss the use of error correction coding to protect against impulsive noise and show that multipath fading reduces the theoretical performance capability by only 1 to 3 dB when proper coding and interleaving are employed. Performance of practical coding schemes using channel state information are used to show the potential performance on an HF channel. Author

N83-30868# Petrie Telecommunications, Nepean (Ontario).
EQUIPMENT: ANTENNA SYSTEMS
L. E. Petrie *In* AGARD Modern HF Commun. May 1983 7 p refs (For primary document see N83-30862 19-32)
Avail: NTIS HC A09/MF A01

Some antenna fundamentals as well as definitions of the principal terms used in antenna engineering are described. Methods are presented for determining the desired antenna radiation patterns for an HF communication circuit or service area. Sources for obtaining or computing radiation pattern information are outlined. Comparisons are presented between the measured and computed radiation patterns. The effect of the properties of the ground on the antenna gain and pattern are illustrated for several types of antennas. Numerous examples are given of the radiation patterns for typical antennas used on short, intermediate and long distance circuits or both mobile and fixed service operations. The application of adaptive antenna arrays and active antennas in modern HF communication systems are briefly reviewed. Author

N83-30869# Mitre Corp., Bedford, Mass.
HF EQUIPMENT: RECEIVERS, TRANSMITTERS, SYNTHESIZERS, AND PERIPHERALS
Q. C. Wilson *In* AGARD Modern HF Commun. May 1983 15 p (For primary document see N83-30862 19-32)
Avail: NTIS HC A09/MF A01

Although long distance communications via satellites has dominated the last two decades of radio equipment development, high frequency (HF) radio equipment is experiencing a high technology renaissance. Satellite systems now transmit quality low data rate communications and navigation aids to mobile users, but the low cost and surviability attributes of HF radio are again being recognized. Emerging new systems automate network operations while adapting to propagation conditions. However, neither new replacement radios nor new systems furnish the potential capability of state-of-the-art components. The advances in equipment, systems, and components are summarized. Author

N83-30870# Norwegian Defence Research Establishment, Kjeller.
PROPAGATION 2. PROBLEMS IN HF PROPAGATION
E. V. Thrane *In* AGARD Modern HF Commun. May 1983 17 p refs (For primary document see N83-30862 19-32)
Avail: NTIS HC A09/MF A01

The ionosphere is not a perfect reflector for HF-waves, and the lecture will review some of the resulting propagation problems. Some of these are encountered during undisturbed ionospheric conditions, such as multipath reflections, but most problems are associated with geophysical disturbances. Solar flares and associated magnetic storms cause absorption, low MUF (Maximum Useable Frequency), scatter due to irregularities, etc. The ionosphere is particularly variable in high latitudes where auroral phenomena influence the reflecting properties of the ionospheric layers. The lecture discusses the presently available short term forecasting techniques, and it also deals with possible ways of

minimizing the effects of ionospheric disturbances, such as path and time diversity, the use of early warnings, and back-up systems. Author

N83-30871# Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass.
HF PROPAGATION MEASUREMENTS FOR REAL-TIME CHANNEL EVALUATION (RTCE) SYSTEMS
Mario D. Grossi *In* AGARD Modern HF Commun. May 1983 16 p refs (For primary document see N83-30862 19-32)
Avail: NTIS HC A09/MF A01

Recent advances in microprocessor technology, in frequency-agile HF equipment and in the understanding of the propagation medium make it feasible and practical the adoption of adaptivity approaches in HF communications. Signal-to-Noise ratio, multipath spread and Doppler spread are the basic parameters to which the link has to adapt itself. A necessary prerequisite for adaptivity is Real Time Channel Evaluation (RTCE). Measurements of these parameters must be performed at several spot frequencies in the band of interest, in order to identify automatically the most suitable carriers for the transmission of the information. RTCE is at present in the R&D phase, and the related activities emphasize the measurement of signal amplitude and noise levels (inclusive of interference) at several frequencies in specific HF paths of interest, with a few instances of inclusion sof multipath spread measurement. There is little doubt that, at the end of the R&D phase, RTCE and link adaptivity will enter the practice of modernized HF communications. Author

N83-30872# Petrie Telecommunications, Nepean (Ontario).
ADAPTIVE SYSTEMS IN OPERATION
L. E. Petrie *In* AGARD Modern HF Commun. May 1983 4 p refs (For primary document see N83-30862 19-32)
Avail: NTIS HC A09/MF A01

The development and evolution of channel evaluation techniques is described. A recently developed fully automatic HF radio telephone system is discussed which automatically selects the suitable channel and also provides a telephone interconnect. Also described is a HF message terminal which automatically requests, repeats and confirms message status for sender and receiver. Author

N83-30873# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
PROPAGATION ASPECTS OF FREQUENCY SHARING, INTERFERENCE AND SYSTEM DIVERSITY
H. Soicher (Army Communications Electronics Command, Fort Monmouth, N.J.) Loughton, England Mar. 1983 401 p refs Conf. held at Issy-les-Moulineaux, France, 18-22 Oct. 1982 (AGARD-CP-332; ISBN-92-835-0329-5) Avail: NTIS HC A18/MF A01

Frequency spectrum management is an extremely important activity that facilitates the orderly use of the electromagnetic spectrum for many telecommunications purposes. Frequency assignment, radio frequency interference, propagation effects on practicability of frequency sharing between services, mechanisms responsible for, and limits posed by interference from strong signals, and techniques available for control of such interference and for increase in channel capacity were discussed. For individual titles, see N83-30874 through N83-30909.

N83-30874# Dartmouth Coll., Hanover, N.H. School of Engineering.
FUNDAMENTAL LIMITATIONS CAUSED BY RF PROPAGATION
Robert K. Crane *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 19 p refs Previously announced in IAA as A81-22880 (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

Propagation phenomena affect the design of radio frequency (RF) transmission systems. Propagation phenomena limit the suitability of portions of the frequency band for some applications, limit the reliability of RF transmission systems, and provide a means of coupling unwanted signals from one system to anouther with the potential of producing interference. The possibility of interference is the fundamental limitation to the unrestricted use of the frequency band. Author

N83-30875# Institute for Telecommunication Sciences, Boulder, Colo. Applied Electromagnetic Science Div.
SOME PROPAGATIONAL ASPECTS OF FREQUENCY ALLOCATION AND FREQUENCY SHARING
H. T. Dougherty and Charles M. Rush *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 11 p refs (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

The propagation phenomena of importance to the allocation and sharing of frequency bands are briefly summarized. Those aspects most significant for the various frequency bands are highlighted, illustrated, and referenced. Systems normally achieve their required grade of telecommunications service (service fields) by reliance upon standard modes of electromagnetic propagation. However, both standard modes (so-called) and anomalous modes of propagation must be considered when describing interference phenomena (interference fields). Further, these standard modes are described for any specific service as tending to be stable (relatively) and predictable. The anomalous modes, however, are described as involving some degree of uncertainty; they tend to be less stable and less predictable/anomalous, can involve different selections across the spectrum and with various services. Hence, for interference fields, the categorization is described herein as essentially by geometry. That is, interference situations are terrestrial Earth to space, or space to space propagational situations. Author

N83-30876# Department of the Army, Washington, D. C.
OVERVIEW OF FREQUENCY SHARING
Earl J. Holliman *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 6 p (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

Frequency engineering is the process of sharing spectrum space among many requirements in a manner which attempts to control potential operational interference. In most cases, the point that operational degradation occurs is identified by technical parameters. All frequencies are shared. In the case of the United States Army, the communication requirements exceed all possible spectrum space by approximately 8 times. The individual user of the radio spectrum would like to be unconcerned with sharing. However, this is not practicable for two reasons. First, the user must share his frequency with noise which is intrinsically involved with his system's design and environment. It influences his own design approaches and establishes limiting conditions of performance for the proposed operation. Secondly, the sharing environment forces him to recognize the presence of other users. In the assignment process, sharing is considered in one or more variations of four concepts. Author

N83-30877# Directorate of Radio Technology, London (England).
RADIO REGULATORY ASPECTS OF FREQUENCY SHARING
L. W. Barclay *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 6 p (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

The requirement for communications, civil and military, analogue and digital, continues to expand and advances in technology have facilitated the expansion. Although much of the demand for data transmission in connection with information technology may be met by the provision of cable and optical fiber links, the pressure for expansion of radio communication continues. Some of the regulatory aspects of the use of the radio frequency spectrum are discussed and one or two of the problems associated with frequency re-use are highlighted. Author

N83-30878# Leicester Univ. (England). Dept. of Physics.
ANOMALOUS ABSORPTION EFFECTS PRODUCED BY HIGH POWER RADIO WAVES IN THE HIGH LATITUDE IONOSPHERE
T. B. Jones, T. Robinson, P. Stubbe (Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau, West Germany), and H. Kopka (Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau, West Germany) *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 9 p refs (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

High power HF radio waves can produce plasma instabilities in the ionosphere which induce major changes in the propagation characteristics of other HF signal propagating through the disturbed region. Experiments to investigate some of these disturbance effects were undertaken using the Max Planck Institut fur Aeronomie, Lindau heating facility at Tromso, Norway. Particular attention is given to the anomalous absorption effects discovered and to the induced phase changes observed in the diagnostic signals. The observations are interpreted in terms of the plasma instabilities generated and are of interest in assessing the performance of HF communication systems when disturbances of this nature are produced in the ionosphere. Author

N83-30879# Max-Planck-Institut fuer Aeronomie, Katlenburg-Lindau (West Germany).
VHF-LONG-DISTANCE-PROPAGATION BY AURORAL BACKSCATTER
Guenther Lange-Hesse *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 14 p refs (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

Extended investigations of VHF auroral backscatter communications was carried out in Europe in the years from 1958 to 1969 using the results of the observation of beacon transmitters and of an extended network of amateur stations convering big parts of Europe. The frequency of occurrence of this kind of propagation as a function of geomagnetic activity and location, time of day, season and sunspot cycle is shown by several diagrams. The physical reasons for this backscatter phenomenon and especially for the typical daily variation in the frequency of occurrence are discussed. Proposals are made for special arrangements to suppress this kind of propagation in case of frequency sharing. Author

N83-30880# Federal Communications Commission, Washington, D. C.
INTERFERENCE AND SHARING AT MEDIUM FREQUENCY: SKYWAVE PROPAGATION CONSIDERATIONS
John C. H. Wang *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 13 p refs (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

A considerable amount of work dealing with nighttime skywave propagation was done; however, some areas remain to be explored. For example, short term variation of field strengths was overlooked. Daytime propagation is far from being quantitatively understood. Also, it is not quite possible to determine interfering signal levels which are present for a small percentage of time with high accuracy. During sunspot cycles 18 and 19, the Federal Communications Commission conducted an extensive field strength measurement program in the midlatitude areas of North America. These and other data are revisited with a new emphasis, namely, interference and sharing. Determination of field strengths exceeded for different percentages of time (1 to 99%), diurnal variation of field strengths, favorable conditions for daytime skywave propagation, effect of magnetic storms, frequency dependence as observed at daytime and nighttime are discussed. Author

N83-30881# Science Research Council, Chilton (England).
SIGNAL AND NOISE VARIABILITY IN HIGH FREQUENCY SKYWAVE RADIO-SERVICE PLANNING
P. A. Bradley *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 14 p refs (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

Procedures existing under the auspices of the International Telecommunication Union for allocating frequency blocks to radio services and for the assignment of specific frequencies to individual radio operators are explained. The compatibility analysis undertaken by the International Frequency Registration Board at high frequencies to test for harmful interference is described and the technical standards used in this analysis are discussed. Work in progress within the International Radio Consultative Committee in preparation for a forthcoming World Administrative Radio Conference on High Frequency Broadcasting concerned with improved standards for field strength estimation, fading, protection ratio and minimum usable field strength is reviewed. Author

N83-30882# Alaska Univ., Fairbanks. Geophysical Inst.
ANOMALOUS PROPAGATION BEHAVIOR OF RADIO SIGNALS AT HIGH LATITUDES
Robert Hunsucker *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 15 p refs (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

Signals in the 3 to 30 MHz (HF) band propagated through polar and auroral ionospheric regions sometimes undergo some unique and profound changes. The channel capacity, intelligibility and reliability of these signals are affected by multipath distortion, backscatter, nongreat circle propagation and other high latitude anomalies. Signals propagated in the very low frequencies (VLF), low frequencies (LF), medium frequencies (MF), very high frequencies (VHF)/ultrahigh frequencies (UHF) and microwave portions of the radio spectrum also undergo some very deleterious effects. Specifically, some of the newer results obtained include: ground constant measurements of tundra permafrost, MF skywave signals and precipitation depolarization of satellite downlink signals.
Author

N83-30883# Hulburt (E. O.) Center for Space Research, Washington, D.C. Ionospheric Effects Branch.
THE APPLICATION OF REAL-TIME MODEL UPDATE BY OBLIQUE IONOSPHERIC SOUNDERS TO FREQUENCY SHARING
Donald R. Uffelman, Lawrence O. Harnish, and John M. Goodman *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 11 p refs (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

Frequency management systems for the high frequencies (HF) currently in use by the US Department of Defense (DoD) rely heavily on manual selection of frequencies which were allocated on a circuit by circuit basis. There is no capability to anticipate frequency changes (QSY's) in advance in a manner such that a frequency being released by one user is utilized effectively and immediately by a second user. A scheme by which a small computer model of the maximum usage frequency (MUF) of the HF channel (MINIMUF 3.5) is made to perform very accurately to anticipate channel characteristics in a short term prediction mode was examined. It is proposed that this model be utilized to provide automated frequency management which would allow one to anticipate frequency availability and thereby sharing of frequencies between several users. Utilizing data obtained from an oblique sounder net on the East Coast of the United States, the manner in which this might be accomplished is demonstrated. Author

N83-30884# Hulburt (E. O.) Center for Space Research, Washington, D.C. Ionospheric Effects Branch.
THE DEVELOPMENT OF AN IONOSPHERIC MODEL THESAURUS AND USER'S GUIDE c82
John M. Goodman *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 12 p refs (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

The preliminary progress on the development of a comprehen-

sive survey of ionospheric models - both physical and empirical - which have, are, or would be employed to evaluate the operation of military radiowave systems. Also to be contained in the survey are forecasting/prediction techniques and propagation effects models together with an evaluation of each based upon available documentation. Author

N83-30885# Middle East Technical Univ., Ankara (Turkey). Dept. of Electrical Engineering.
MEDIUM WAVE GROUNDWAVE PROPAGATION MODEL-NUMERICAL AND EXPERIMENTAL RESULTS
A. F. Fer and A. Hizal *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 9 p refs (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

Two computer models incorporating two different groundwave propagation analysis techniques are investigated. The first model is a perturbation technique based on the approach by King Maley and Wait and represents an extention of the previous results to take into account an n-section propagation path. The second model is the integral equation solution for irregular and inhomogeneous terrain based on the formulation by Ott (i.e. PROGRAM WAGNER). The results from the two approaches are compared with each other as well as the results from Millington formula for multisection paths and knife edge diffraction for mountainous regions. Limited amount of experimental data is also compared with computed values for ground wave propagation from Trabzon Broadcast transmitter over the Eastern Anatolian mountain ranges. Computer modelling for the study of ground wave propagation is seen to present an economically advantageous tool in the design of medium frequency (MF) communication links. Author

N83-30886# Institute for Telecommunication Sciences, Boulder, Colo.
A COMPUTATIONAL MODEL FOR MULTIPLE KNIFE-EDGE DIFFRACTION
L. E. Vogler and P. M. McManamon *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 7 p refs (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

The derivation of a multiple knife edge attenuation function is described. This exact multiple integral is transformed into a series suitable for numerical evaluation. The series solution is implemented as a computer program capable of calculating the attenuation over a path consisting of up to 10 knife-edges. Theoretical attenuation calculations are compared with observed measurements for a 15-km path containing 5 knife edges. The significance of atmospheric refractivity on multiple knife edge diffraction is discussed, and a means to use this to provide information about the statistical distribution of propagation loss over specific paths is suggested. E.A.K.

N83-30887# Maritime Telegraph and Telephone Co. Ltd., Halifax (Nova Scotia).
VHF/UHF PROPAGATION STUDIES ON LONG OVER THE HORIZON SALT WATER RADIO PATHS
Richard E. Grantham and W. P. Lonc (Saint Mary's Univ.) *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 11 p refs (For primary document see N83-30873 19-32)
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The nature of short term and long term path are outlined, and the preliminary observations of the data collected are described. Received Signal Levels were monitored and recorded over a number of long range (200 km) salt water radio paths. It is revealed that mean signal levels received are higher than anticipated and that a usable path can be established with 1 kW ERP levels. The propagation is characterized by short deep fades and there are only rare occasions when the signal drops below usable limits for extended periods. A strong seasonal effect was recorded. Path reliability approaches 100% during the summer and as low as 50% during the winter. The fast fading effect can be reduced significantly with space diversity reception and the reliability could exceed 95% with simple diversity arrangements. Space and frequency diversity, if required, would offer near 98% reliability for voice communications. Circular polarization appears to suffer less from fast fades than linear polarization. It is found that the differences in performance between UHF (400) and VHF (140) are not pronounced. E.A.K.

N83-30888# Technische Hogeschool, Eindhoven (Netherlands).
MODELLING ON INTERFERENCE DUE TO DUCTING AT FREQUENCIES ABOVE 1 GHz
J. Dijk, J. vanTiggelen, and J. Neesen (Neher Labs., Leidschendam, Netherlands) *In* AGARD Propagation Aspects of Freguency Sharing, Interference and System Diversity Mar. 1983 13 p refs (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

A theoretical basis and the numerical tools for the calculation of the field strength due to ducting in beyond the horizon microwave links are presented. The purpose is a contribution to the understanding of the propagation phenomena involved and to provide some physical basis for the predictive techniques to be considered for the evaluation of mutual interference between radio communication systems, operating at frequencies above 1 GHz. E.A.K.

N83-30889# Service Meteorologique Metropolitan, Paris (France).
STATISTICAL STUDY OF ELEVATED DUCTS EXTENSION
B. Strauss and J-L. Dumas *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 3 p (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

The spatial extension of elevated ducts using meteorological radiosondes soundings were studied. A limited extension of a duct to the sounding station is found in about 85% of the cases.E.A.K.

N83-30890# Centre National d'Etudes des Telecommunications, Issy-les-Moulineaux (France).
MULTIPLE DIFFUSION BY HYDROMETEOROLOGY: A NUMERICAL SIMULATION [LA DIFFUSION MULTIPLE PAR LES HYDROMETEORES: UNE SIMULATION NUMERIQUE]
N. Spanjaard and J. Lavergnat *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 6 p refs In FRENCH (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

The influence of hydrometeorology on millimeter wave propagation and those due to multiple diffusion was studied. It is found that at these frequencies the wavelength is near the characteristic dimensions of diffusing cores. Consequently the relationship between efficacious section of diffusion and of absorption is on more levels of higher magnitude, superior to those which concern waves with inferior frequencies at 10 GHz. Transl. by E.A.K.

N83-30891# Essex Univ., Colchester (England). Dept. of Mathematics.
BISTATIC RADAR REFLECTIVITIES IN THE RANGE 11-30 GHz
D. G. Charlton, A. R. Holt, and B. G. Evans *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 9 p refs (For primary document see N83-30873 19-32)
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Bi-static scattering cross sections and reflectivities for the scattering of microwaves by raindrops are presented. Exact results for spheroids were compared with exact results for spheres, and approximate calculations for spheroids using Rayleigh Theory. Results are given for several frequencies in the range 11-30 GHz, and for both a terrestrial and a satellite path. It is found that the Rayleigh approximation gives significant errors in certain cases. The results have implications or the calculation of interference between communication systems. E.A.K.

N83-30892# British Telecommunications Research Ltd., Martlesham Heath (England).
OVERSHOOT INTERFERENCE ON MICROWAVE RADIO LINKS DUE TO THE CO-EXISTENCE OF MULTIPATH FADING AND

TRANS-HORIZON PROPAGATION

J. E. Doble *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 7 p ref (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

Periods of meteorological conditions which lead to multipath effects on line of sight systems and which can also be those during which anomalous transhorizon propagation is present are outlined. The coexistence of these two effects cause increased system sensitivity to overshoot interference from one section of a microwave route into subsequent sections, or into other systems. Current overshoot interference calculations treat these two effects as uncorrelated and the degree to which this assumption is in error was estimated from independent measurements on transhorizon links and terrestrial links terminating in the same area. E.A.K.

N83-30893# Lockheed Missiles and Space Co., Sunnyvale, Calif.
SYSTEM ASPECTS OF CLEAR AIR PROPAGATION ABOVE 40 GHz

David M. Theobold and Jerry D. Hopponen *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 9 p refs (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

Communication links operating at frequencies above 40 GHz may be modeled by computer programs which treat both the atmosphere and communication hardware of the system in an integrated fashion. Absorption by atmospheric gases and turbulence effects are considered. Link degradations due to seasonal variations are treated. Absorption by molecular oxygen and water vapor causes dispersive signal attenuation, phase delay, and noise due to random atmospheric emission. These quantities may be predicted for specific frequency bands and atmospheric conditions by employing a computer program for ray tracing. The characteristics of the atmospheric transfer function are of importance to questions of modulation distortion in high data rate systems. The atmosphere is viewed as an additional signal filter of the communication channel and the resultant signal distortion is quantified by predicting bit error rate degradation. E.A.K.

N83-30894# Essex Univ., Colchester (England).
PROPAGATION CONSTRAINTS IN THE MILLIMETER WAVEBANDS DUE TO PRECIPITATION SCATTERING

B. G. Evans and A. R. Holt *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 10 p refs (For primary document see N83-30873 19-32)
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Theoretically derived forward and backward scattering calculations for precipitation up to 210 GHz. Simple scaling rules are investigated for forward and backward directions which allow scattering parameters at one frequency to be derived from other frequencies thus obviating the need for exhaustive and complex calculations. Predictions of propagation degradations for communication and radar systems operating in the millimeter wave bands are given. E.A.K.

N83-30895# AEG-Telefunken, Ulm (West Germany). Geschaeftbereich Hochfrequenztechnik.
A mm-WAVE COLLISION WARNING DEVICE FOR HELICOPTERS

B. Rembold, H. G. Wippich, M. Bischoff, and W. F. X. Frank *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 9 p refs (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

Using the frequency slot of maximum atmospheric attenuation around 60 GHz a short range collision warning device for helicopters was developed. The system consists of a pulsed radar sensor using semiconductors exclusively, a fast scanning mechanism and a display. First measurements show that high voltage transmission lines with diameters of about 20 mm can be detected at a distance of more than 400 m. E.A.K.

N83-30896# Lincoln Lab., Mass. Inst. of Tech., Lexington.
A PREDICTOR MODEL FOR EHF COMMUNICATION SATELLITE SYSTEM AVAILABILITIES IN THE PRESENCE OF RAIN

Leonard M. Schwab and Alan J. Simmons *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 11 p refs Sponsored by Defense Communications Agency (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

Rain attenuation of millimeter waves has a major effect upon link availability which is the major element of system availability. A computer based tool for assessing the effect of rain attenuation upon availability was developed to aid in selecting fundamental MILSATCOM parameters such as satellite subpoint and operating frequency as well as secondary parameters such as design margin and antenna radiation patterns. E.A.K.

N83-30897# GTE Labs., Inc., Waltham, Mass.
DIVERSITY RECEPTION OF COMSTAR 19/29 GHz SATELLITE BEACONS IN CONVECTIVE RAIN CLIMATE OF FLORIDA, 1978 - 1981

D. Davidson, D. D. Tang, and S. C. Bloch (Univ. of South Florida, Tampa) *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 12 p refs (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

Tampa, Florida has about 90 thunderstorm days per year, nearly all in summer, dominated by events tending to occur in afternoon or early evening. Results of 19 GHz downlink rain attenuation diversity studies are reported for a period of 29 months, which includes three rainy seasons. Despite marked month to month differences, long term measurements with the two larger spacings indicates that for separations above about 15 km diversity performance is not sensitive to spacing or orientation. During a fourth rainy season, using a 29 GHz beacon and the 16 km spacing, performance was similar to that predicated by scaling the 19-GHz results of the previous seasons. For rain climates like Tampa's, some form of site diversity will be required for high reliability SHF satellite links. E.A.K.

N83-30898# Portsmouth Polytechnic (England). Dept. of Electrical and Electronic Engineering.
SCINTILLATION MODELLING AND MEASUREMENT. A TOOL FOR REMOTE-SENSING SLANT PATHS

E. Vilar and J. Haddon *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 13 p refs (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

The use of spectral analysis amplitude scintillations as a remote-sensing tool of a slanted path is investigated in order to derive values of c sub N(2), turbulent path L, and dominant eddy size. Relevant propagation aspects are reviewed nd extended, a layer model analyzed in detail, and experimental results are presented and discussed. The limitations of the remote-sensing technique are also discussed, particularly the use cross-path wind v sub t. The remote-sensing of v sub t is briefly outlined and relevant antenna aperture effects are also considered. Author

N83-30899# British Telecommunications Research Ltd., Martlesham Heath (England).
LONG TERM CROSS-POLAR STATISTICS AT 12 AND 14 GHz ON A 30 DEG SLANT-PATH

R. G. Howell, J. Thirlwell, and D. J. Emerson *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 9 p refs (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

Slant-path propagation measurements relevant to the design of dual-polar satellite systems are reported. The measurements were made on a 29.9 deg elevated slant-path during the period July 1978 to September 1981 using the Orbital Test Satellite (OTS) in conjunction with a 6.1 m off-set Cassegrain aerial located at Martlesham Heath near Ipswich (UK). Co-polar and cross-polar circularly polarized signals at a frequency of 14.5 GHz were

transmitted to the satellite. These signals were down-converted to 11.8 GHz and re-transmitted to the ground together with a 11.8 GHz circularly polarized beacon signal. In addition measurements were made on an 11.6 GHz linearly polarized telemetry carrier transmitted by the satellite. Cumulative statistics of the cross-polar discrimination (XPD) for the 11.6 and 11.8 GHz signals are presented and the XPD statistics for the 14.5 GHz signal estimated. The statistical significance of the depolarization produced by high altitude ice crystals is discussed. The relationship XPD = U - V log CPA proposed by the CCIR to relate XPD to the co-polar attenuation (CPA) (dB) for rain is investigated and values for U and V obtained. The dependence of depolarization on the type of polarization (linear compared to circular) is studied and compared with theory. Author

N83-30900# Communications Satellite Corp., Clarksburg, Md. Propagation Studies Dept.
FADING STATISTICS OF C-BAND SATELLITE SIGNAL DURING SOLAR MAXIMUM YEARS (1978 - 1980)
D. J. Fang and C. H. Liu (Illinois Univ., Urbana) *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 14 p refs (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

From January 1978 to June 1980, scintillation experiments were conducted at the Hong Kong Earth station. INTELSAT satellite signals at 4 GHz were received via both the Pacific Ocean Region (POR) and Indian Ocean Region (IOR) satellite-Earth links. Severe intensity scintillations with peak-to-peak fluctuations up to 14 dB were observed on many evenings during the equinoctial period. This paper presents detailed statistics of the scintillating signals. The level of fluctuations based on the scinillation index is evaluated, and fading rates in terms of the coherence time are examined and correlated with the level of scintillation. Power spectrum densities are also assessed. The high-frequency asymptotes, i.e., the roll-off slopes at frequencies above the Fresnel frequency, as approximated by f(-n), are derived for different levels of fluctuations. For system applications, various cumulative statistics, including annual and worst-month statistics, diurnal variations, and sunspot cycle dependence are summarized. Author

N83-30901# Siemens A.G., Munich (West Germany).
NEW ASPECTS IMPROVING THE AVAILABILITY OF DIGITAL LOS-RADIO RELAY LINKS DEDUCED FROM WIDE-BAND MEASUREMENTS AT 5 AND 15 GHz
M. Niemeyer, W. Schway and B. Sommer *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 16 p refs (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

This paper will first describe a frequency sweep method based on recordings of broadband amplitude distortions which were continuously performed over a period of two years. Measurements have been carried out on a 60 km path in the 5 and 15 GHz frequency range. The relative measuring bandwidth was 2 and 3%, respectively. The analysis of the records revealed two important results: First, the statistical consideration of the long term experiments yields to a prediction about the availability of digital radio links as a function of the occupied bandwidth provided, that no additional diversity measures are used. Second, the analysis of the determined coherence bandwidth allows a physical interpretation of the interference phenomena. The model of a dominating 3 path propagation found by these experiments could be proved with the aid of a high directive, tracked antenna system (3 dB-beamwidth approximately 0.3 degree) in the 15 GHz frequency range. B.W.

N83-30902# Manchester Coll. of Science and Technology (England). Dept. of Electrical Engineering and Electronics.
OCCUPANCY MEASUREMENTS ACROSS THE ENTIRE HF SPECTRUM
Geoffrey F. Gott, Ngiam F. Wong, and Santanu Dutta *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 13 p refs (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

The paper outlines the various aspects of a research program into the characteristics of interference at HF, and gives measured results of occupancy across the entire HF spectrum. These occupancy values are given for several thresholds, and for the different HF user frequency allocations, as defined by ITU regulations. They are presented for day and night conditions, at times of the year corresponding to the winter and summer solstices, for a period of high sunspot activity. Author

N83-30903# Directorate of Radio Technology, London (England).
PROPAGATION DATA FOR VHF PLANNING IN THE UK AREA
K. A. Hughes and J. A. Lane *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 10 p refs (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

Demand for VHF spectrum in the UK requires sharing of frequency bands by different services. Fundamental to the planning of shared bands is the prediction of the potential interference between the services for small percentages of the time. The most well established prediction method at VHF is probably that given in CCIR Recommendation 370. As an aid to UK spectrum planning, the suitability of Recommendation 370-4 has been investigated for propagation paths within, or terminating in the UK. Comparisons have been made between long term measurements and predicted values of field strength using the Recommendation. For some categories of path, measured field strengths were found to exceed predicted values by some 10 dB; other categories however, show good agreement. the applicability of the Recommendation to current planning requirements is discussed in the light of the comparisons. Author

N83-30904# Operations Research, Inc., Silver Spring, Md.
IMPLICATIONS OF PROPAGATION UNCERTAINTIES IN FREQUENCY SHARING ANALYSES
Thomas M. Sullivan *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 6 p refs (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

Frequency sharing analyses are used for a variety of spectrum management purposes. These applications include procedures for identifying frequency assignment coordination requirements, the planning of telecommunication services, the derivation of frequency sharing criteria, and detailed Electromagnetic Compatibility (EMC) analyses. An examination of interfering signal power levels that are exceeded for no more than some specified percentage(s) of time is generally required in frequency sharing analyses. Also, depending on the application, an analysis of the desired signal power levels exceeded for at least some specified time percentage(s) is needed. These evaluations of the desired or interfering signal power levels are based on service quality objectives, equipment parameter values, and propagation predictions. The latter two factors embody uncertainties that affect not only service quality, but also spectrum utilization efficiency. The objectives of various frequency sharing analysis applications and the potential consequences of analytical uncertainties were considered. Analytical techniques used in frequency sharing analyses and the associated sources of analytical uncertainties were reviewed. Finally, the implications of propagation uncertainties in frequency sharing analyses were examined in light of other analytical uncertainties. The implications of propagation prediction uncertainties depend on the frequency sharing analysis application and can range from unacceptable interference to inefficient use of the spectrum. Author

N83-30905# Army Communications-Electronics Command, Fort Monmouth, N.J. Center for Systems Engineering and Integration.
PROPAGATION PREDICTION USAGE IN AUTOMATED FREQUENCY ASSIGNMENTS BASED ON COSITE AND REMOTE SYSTEM SPECTRUM SHARING

Samuel M. Segner *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 9 p refs (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

This paper covers the use of propagation predictions in the US Army (automated) Battlefield Spectrum Management and Engineering (ABSM&E) capability development program. This program is divided into nine tasks. The major task is the US Army (automated) Tactical Frequency Engineering System (ATFES) Pilot Program. This task will set up the experimental and test structure by fielding vertical slice of an integrated capability in US Army Europe. These ADP systems will initially spectrum manage LOS, TROPO, and HF systems. Eventually, all communications and electronic (radar, sensors and avionics) will be managed by new software now in development for these spectrum assests of command control and weapons systems. A major function of ABSM&E is to provide coordination of friendly force use of spectrum with friendly force ECM systems. The basic common interest here is the propagation aspect of each spectrum dependent system in each community. Author

N83-30906# Nova Scotia Technical Coll., Halifax. Dept. of Electrical Engineering.
ON COMBATING MULTIPATH EFFECTS USING SPREAD-SPECTRUM SYSTEMS
C. P. Tou *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 11 p refs (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

This paper discusses briefly the origins of multipath propagation, their effects on radio communication systems, and schemes for suppressing these effects. Major attention is given to spread spectrum schemes to demonstrate their capacity to combat multipath effects, to examine conditions under which the schemes would be effective, and to assess the merits of the schemes. Multipath propagation can occur under various atmospheric and geographical conditions as illustrated by simple examples. The adverse effects of multipath propagation on communication systems can be described in terms of selective fading and intersymbol interference. Simple measures can be found if the multipath propagation is predictable, but sophisticated techniques are required to combat unpredictable multipath interference. It has been shown that spread spectrum systems are superior to other approaches in terms of effectiveness in combating multipath interference and other valuable features. However, the ability of spread spectrum systems to suppress interference depends on the process gain of the system and the system performance depends on the degree of synchronization which can be established by the system. Author

N83-30907# Shape Technical Center, The Hague (Netherlands).
A SPECTRAL EMISSION MASK FOR DIGITAL TROPOSPHERIC SCATTER TRANSMISSION
R. K. P. Galpin *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 9 p refs (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

A spectral emission mask definition for high power digital radio transmission is proposed. Developed for use in the specification of digitalized ACE high troposcatter links, it is offered for consideration by industry and frequency planning authorities. Similar in form to the FCC mask definition for digital LOS radio, the proposed definition is believed to be a reasonable compromise between minimizing interference into adjacent radio channel allocations and avoiding the imposition of costly constraints upon the manufacturers and operators. Computer simulations supported by spectral measurements at 10 kW have shown that well designed filtering (with negligible intersymbol interference) before the high power amplifier is very effective in reducing out of band emission, and that the proposed mask can be satisfied with a signal having a bandwidth utilization efficiency of 1.6 bit/s/Hz when operating at 2 dB below saturation of the klystron amplifier. Author

N83-30908# Technische Hogeschool, Eindhoven (Netherlands). Telecommunications Div.
INTERFERENCE REJECTION BY AUXILIARY FEEDS IN CASSEGRAIN EARTH TERMINALS
J. Arnbak, M. H. A. J. Herben, and R. A. C. M.,vanSpaendonk *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 10 p refs (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

This paper reviews progress in an ongoing study of interferometric sidelobe suppression by auxiliary feeds in Cassegrain antennas. The isolation improvements are explored and related to the feed geometry, orbital spacing between satellites, and required excitation levels. The system value of this modernization option is very relevant as an interference mitigation scheme in the various satellite networks now in widespread use. B.W.

N83-30909# Institute for Telecommunication Sciences, Boulder, Colo.
GAIN PATTERNS OF MICROWAVE COMMON CARRIER ANTENNAS
A. G. Hanson and P. M. McManamon *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 9 p refs (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

This paper summarizes analytical expressions which describe the off-axis radiation characteristics of 924 transmit antenna models in use within the continental United States in the 2, 4, 6, and 11 GHz common carrier microwave terrestrial radio service. Data are presented in a uniform format which permits the user to determine power gain for any antenna identified, at any off-axis azimuthal angle. The primary application of these data is for interference prediction among microwave links and between microwave links and communication satellite Earth terminals sharing a common frequency band. B.W.

N83-31174* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
CORRELATED MEASUREMENTS OF UHF RADAR SIGNATURES, RF RADIATION, AND ELECTRIC FIELD CHANGES FROM LIGHTNING
D. M. LeVine and Vladislav Mazur (Oklahoma Univ., Norman) *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 11 p refs (For primary document see N83-31163 19-47)
(Contract NCC5-600)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31199 Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
ELECTROMAGNETIC MEASUREMENTS OF LIGHTNING ATTACHMENT TO AIRCRAFT
P. L. Rustan, B. P. Kuhlman, J. Shovalter, and J. Reazer (Technology/Scientific Services) *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 8 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31217* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A SOLUTION FOR THE ELECTROMAGNETIC FIELDS CLOSE TO A LIGHTNING DISCHARGE
D. M. LeVine and R. Meneghini *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 10 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31218 Centre National d'Etudes des Telecommunications, Lannion (France).
TROPICAL LIGHTNING: ELECTROMAGNETIC CHARACTER-

IZATION C.O.P.T. 81 EXPERIMENT (TROPICAL DEEP CONVECTION)
C. Leteinturier, J. Hamelin, and M. LeBoulch *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 12 p refs Sponsored in part by ONERA (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31219 Mission Research Corp., Albuquerque, N. Mex.
THE EFFECT OF PROPAGATION ON ELECTROMAGNETIC FIELDS RADIATED BY LIGHTNING
Louis Baker and Robert L. Gardner *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 4 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31232 Ohio Univ., Athens. Center for Avionics Engineering.
THE EFFECTS OF PRECIPITATION STATIC AND LIGHTNING ON THE AIRBORNE RECEPTION OF LORAN-C
James D. Nickum *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 10 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N83-30910 Academy of Sciences (USSR), Moscow.
UNSTEADY LOW-HYBRIDIZED DRIFT OSCILLATION AND POLAR MAGNETIC RECOMBINATION
M. A. Malkov and V. I. Sotnikov 1982 26 p refs In RUSSIAN (Pr-711) Copyright. Avail: Issuing Activity

Unsteady shortwave drift oscillation with a high-valve beta factor is examined. Unsteady electric poles and beta > T sub i/T sub e are discussed. The polar magnetic recombiny mechanism, basis for the application of unsteady data to the magnetopause, is examined. The magnetopause width is estimated.
Transl. by N.W.

N83-30911*# Hein Engineering Corp., Sunnyvale, Calif.
DEVELOPMENT, DESIGN, FABRICATION AND EVALUATION OF A REAL-TIME VIDEO COMPRESSION SYSTEM
D. N. Hein Jul. 1983 22 p
(Contract NAS2-10481)
(NASA-CR-166500; NAS 1.26:166500) Avail: NTIS HC A02/MF A01 CSCL 09C

This is the final report on the work done by David Hein at the NASA-AMES Research Center. The main emphasis is on the work done on the Conditional Replenishment Emulator. The progress for May and a description of the emulator are given. Brief summaries of the work that was done in the other areas covered by the contract over the entire contract period are also provided. Author

N83-30912*# National Aeronautics and Space Administration, Washington, D. C.
TECHNIQUE FOR MICROSWITCH MANUFACTURE
T. Kitamura and S. Kiyoyama May 1983 9 p Transl. into ENGLISH of Japanese Patent no. 57-22172 (12 May 1982) p 63-66 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-77234; NAS 1.15:77234) Avail: NTIS HC A02/MF A01 CSCL 09C

A five-step technique for microswitch manufacture is described: (1) A clad board is inlaid with a precious metal and the board is pressed. (2) One end of the fixed contact containing a precious metal inlay section is curved, and this edge of the precious metal inlay section becomes a fixed contact. (3) Inserts are formed in the unit body and terminal strips are placed through the top and bottom of the base and held. (4) The unit body is held by the base and the sequential contact strips are cut off. (5) Movable stripes are attached to the support of the terminal strips on the movable side and movable contacts are placed opposite the fixed contacts. Author

N83-30913*# National Aeronautics and Space Administration, Washington, D. C.
ILLUMINATED PUSH-BUTTON SWITCH
Toshio Iwagiri May 1983 11 p Transl. into ENGLISH from Japanese Kokai Patent No. 57-22169 (12 May 1982) p 47-51 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prepared by Omron Tatesisi Electronics Co. Ltd.
(Contract NASw-3541)
(NASA-TM-77235; NAS 1.15:77235) Avail: NTIS HC A02/MF A01 CSCL 09A

An illuminated push-button switch is described. It is characterized by the fact that is consists of a switch group, an operator button opening and closing the switch group, and a light-emitting element which illuminates the face of the operator button. L.F.M.

N83-30914*# Westinghouse Electric Corp., Pittsburgh, Pa.
ADVANCED AXIAL FIELD D.C. MOTOR DEVELOPMENT FOR ELECTRIC PASSENGER VEHICLE Final Report
William J. Jones Dec. 1982 125 p
(Contracts DEN3-75; DE-AI01-77CS-51044)
(NASA-CR-167985; DOE/NASA/0075-82/1; NAS 1.26:167985; Rept-83-8J22-EVMOT-R1) Avail: NTIS HC A06/MF A01 CSCL 13F

A wound-field axial-flux dc motor was developed for an electric vehicle drive system. The motor is essentially an axial-flux version of the classical Gramme-ring winding motor, but the active conductors are recessed into slots cut into the two opposite faces of the laminated tape-wound core ring. Three motors were built and tested in the program. The second (functional) model was a six-pole machine which weighed 88.5 kg. It developed 16.9 km (33.0 hp), and a max speed of 4800 rpm. Full load efficiency was 92% and predicted SAE D-cycle efficiency was 88%. The last engineering) model was a 4-pole machine with compoles, allowing a weight reduction to 45 kg (100 lbs.) while addressing some manufacturability problems. The engineering model was rated at 13.2 kw (17.6 hp) at 3000 rpm, with a peak power of 19.8 km (26.4 hp) and a max speed of 7200 rpm. Initial test results on this motor showed poor commutation and efficiency; the program was terminated without resolution of these problems. Author

N83-30915*# Levi (Enrico), Inc., Forest Hills, N.Y.
PRELIMINARY ASSESSMENT OF THE TRADEOFFS BETWEEN THE ELECTRIC MOTOR AND THE TRANSMISSION IN ELECTRIC VEHICLES Final Report
Enrico Levi May 1983 63 p refs
(Contract DE-AI01-77CS-51044; NASA Order C-41981-D)
(NASA-CR-168199; DOE/NASA/1981-1; NAS 1.26:168199) Avail: NTIS HC A04/MF A01 CSCL 13F

The efficiency, weight, and cost of various propulsion system for 4-passenger electric vehicles are compared. These systems comprise the electric motor and the required speed reducing transmission to obtain the appropriate speed at the wheel. Three types of motors, dc synchronous, and squirrel-cage were considered at 6000 ycm and 24 000 rpm for a peak power of 40 kW. Two types of gearing selected were a single speed differential and a differential with a differential with a 4-speed gearbox. Only components that were readily realizable within present state-of-the-art were considered. Author

N83-30916# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
NEW FUNCTIONAL ELEMENTS
Munenori Sakamoto 2 Mar. 1983 30 p Transl. into ENGLISH from Denshi Zairvo (Japan), no. 4, Apr. 1982 p 36-43
(AD-A126970; FTD-ID(RS)T-1829-82) Avail: NTIS HC A03/MF A01 CSCL 05/3

Research and development trends in electronic functional elements are discussed. In particular, ultralattice elements, three-dimensional circuit elements, and environment-proof elements are addressed. M.G.

N83-30917# Princeton Univ., N. J. Information Sciences and Systems Lab.
THRESHOLD DETECTION IN NARROWBAND NON-GAUSSIAN NOISE Technical Report, Aug. 1982 - Jan. 1983
Kenneth S. Vastola Mar. 1983 34 p refs
(Contract N00014-81-K-0146)
(AD-A127319; TR-9; TR-46) Avail: NTIS HC A03/MF A01 CSCL 09/4

The Middleton Class A narrowband non-Gaussian noise model is examined. It is shown that this noise model (which is known to fit closely a variety of non-Gaussian noises) can itself be closely approximated by a computationally much simpler noise model. It is then shown by numerical examples that, for the problem of locally optimum detection, the simplest form of this approximation yields nearly optimal (asymptotic) performance. The performance of other simple suboptimal threshold detectors in Class A noise is also examined. Finally, a useful relationship between the Class A model and the epsilon-mixture model is developed. Author (GRA)

N83-30918# TRW Defense and Space Systems Group, Redondo Beach, Calif. Applied Technology Div.
DEMONSTRATION OF SQUID (SUPERCONDUCTING QUANTUM INTERFERENCE DEVICE) PARAMETRIC AMPLIFIER Annual Report, 14 Sep. 1981 - 14 Sep. 1982
A. H. Silver Nov. 1982 34 p refs
(Contract N00014-81-C-2495; XF62584004)
(AD-A127269; AR-1) Avail: NTIS HC A03/MF A01 CSCL 09/5

This is the first Annual Report of an effort to demonstrate a low noise superconducting microwave amplifier. The amplifier is a nearly degenerate, single idler parametric amplifier which uses the nonlinear inductance of a single junction SQUID (Superconducting Quantum Interference Device). The design frequency is 9 GHz, 10 dB gain, and 16% bandwidth. In order to maximize the saturation power, the device impedance was chosen near 1 ohm and a matching network was designed to transform to 50 ohm. In later designs, a coherent array of SQUIDs is expected to increase the power and impedance. This report includes the design and test of the 50 ohm to 1 ohm broadband transformer, design and fabrication of the SQUID amplifier, and both saturation and noise analyses of the single SQUID and SQUID array. The analytical results, reported to the 1982 Applied Superconductivity Conference are: the noise temperature of the single SQUID parametric amplifier is equal to the amplifier termination temperature T(o), the response is linear to several percent of the flux quantum energy in the SQUID: the amplifier will be saturated by broad band noise if the noise source temperature is much greater than 10 To; and the array parametric amplifier has the same noise temperature as the single device indicating an N-fold increase in dynamic range.
Author (GRA)

N83-30919# RCA Labs., Princeton, N. J. Microwave Subsystems Group.
FET FREQUENCY DISCRIMINATOR Final Report, 20 Apr. 1977 - 31 Dec. 1981
F. D. Mawhinney Mar. 1982 47 p refs
(Contract N00039-76-C-0280)
(AD-A127256; RCA-PRRL-82-CR-11) Avail: NTIS HC A03/MF A01 CSCL 09/1

The FET Frequency Discriminator is an experimental microwave frequency discriminator developed for use in a specialized set-on VCO frequency memory system. Additional development and evaluation work has been done during this program to more fully determine the applicability of the FET frequency discriminator as a low-cost, expendable receiver front-end for both surveillance and ECM systems. Various methods for adjusting the frequency-to-voltage characteristic of the discriminator as well as the effects of detector characteristics and ambient temperature changes were evaluated. A number of discriminators for use in the 7- to 11-GHz and the 11to 18-GHz bands were fabricated and tested. Interim breadboard and final packaged models were either delivered or installed in developmental frequency systems. The major limitations and deficiencies of the FET frequency discriminator that were reviewed during the program include the effects of temperature, input power level variations, nonlinearity, and component repeatability. Additional effort will be required to advance the developmental status of the FET frequency discriminator to the level necessary for inclusion in low-cost receiver systems, but the basic simplicity of the approach continues to show much promise. Author (GRA)

N83-30920# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
CONVERSION OF ALGORITHMS TO CUSTOM INTEGRATED CIRCUIT DEVICES Final Report, 15 Mar. 1981 - 14 May 1982
Jonathan Allen 30 Dec. 1982 30 p refs
(Contract F49620-81-C-0054; AF Proj. 2305)
(AD-A127169; AFOSR-83-0248TR) Avail: NTIS HC A03/MF A01 CSCL 09/3

This report gives an overview, work statement, and status of research for the contract Conversion of Algorithms to Custom Integrated Circuits. The basic conceptual framework for this work is to recognize that the design of custom integrated circuits involves the specification of a number of different levels of representation that are qualitatively as well as quantitatively different, and that there is the necessity to derive a set of transformations between these representations so that the complete design can be specified. Accordingly, the work described in this report deals with ways in which these representations can be established as well as the means of deriving one representation from others. An overview of the entire project is given, followed by detailed description of several different projects focused on the different levels of representation. These include artwork analysis, circuit characterization, logic checking, the design for several application domains, and comments relative to the changing technological base. GRA

N83-30921# Thomas Electronics Inc., Wayne N. J.
MANUFACTURING METHODS AND TECHNOLOGY (MM&T) SPECIFICATIONS FOR MINIATURE CATHODE RAY TUBE Quarterly Report, 1 Oct. - 31 Dec. 1982
F. M. Bruno 31 Jan. 1983 20 p
(Contract DAAK70-80-C-0168)
(AD-A127160; TEI-A009-9; QR-9) Avail: NTIS HC A02/MF A01 CSCL 09/1

Improvements in vibration-testing techniques led to the satisfactory performance of CRTs in continuing pre-vibration tests. Pending final approval of its ATP and QTP, TEI was fabricating CRT components preparatory to manufacture and test of phase 2 - Confirmatory samples. Life testing of the P43 phosphor was successfully concluded. GRA

N83-30922# Office of Naval Research, London (England).
THE 2ND CONFERENCE ON SEMI-INSULATING III-V MATERIALS
S. G. Bishop and E. M. Swiggard 28 Feb. 1983 13 p Conf. held in Evian, France, 19-21 Apr. 1982
(AD-A126918; ONRL-C-2-82) Avail: NTIS HC A02/MF A01 CSCL 05/1

The Second Conference on Semi-insulating III-V Materials dealt with four main issues: growth of bulk III-V crystals, assessment of high resistivity materials, behavior of high resistivity materials under heat treatments, and problems of III-V devices related to the semi-insulating conditions. GRA

N83-30923# Lincoln Lab., Mass. Inst. of Tech., Lexington. Data Systems Div.

ADVANCED ELECTRONIC TECHNOLOGY Quarterly Technical Summary Report, 1 Aug. - 31 Oct. 1982
Alan J. McLaughlin and Alan L. McWhorter 15 Nov. 1982 33 p refs
(Contract F19628-80-C-0002; AF Proj. 649L)
(AD-A126917; ESD-TR-82-101) Avail: NTIS HC A03/MF A01 CSCL 09/5

Contents: RVLSI Circuits; Restructurable VLSI Technology; Semiconductor Processing; Device Theory. Solid State Device Research; Quantum Electronics; Materials Research; Microelectronics; and Analog Device Technology. GRA

N83-30924# Los Alamos Scientific Lab., N. Mex.
MODELING OF HIGH-EXPLOSIVE-DRIVEN PLASMA OPENING SWITCHES
A. E. Greene, J. H. Brownell, T. A. Oliphant, G. H. Nickel, and D. L. Weiss Mar. 1983 17 p refs
(Contract W-7405-eng-36)
(DE83-009272; LA-9702-MS) Avail: NTIS HC A02/MF A01

High explosive driven plasma opening switches were modeled in one dimension using the Lagrangian MHD code RAVEN. Calculations were made in both cylindrical and planar geometry. Simple compression accounts for observed resistance increases at early times (time-of-flight of the high-explosive detonation products across the plasma conducting channel). It is suggested that some improvements in switch performance might be achieved through a choice of gases in the plasma channel and by lowering the pressure in the channel. DOE

N83-30925# California Univ., Livermore. Lawrence Livermore Lab.
HIGH-POWER MICROWAVE-PULSE SUSCEPTIBILITY OF DISCRETE SEMICONDUCTOR DEVICES
C. F. McConaghy, L. C. Martin, and J. H. Yee 1983 6 p refs Presented at the High Power Microwave Conf., Adelphi, Md., 1-3 Mar. 1983 Submitted for publication
(Contract W-7405-eng-48)
(DE83-007353; UCRL-88702; CONF-830314-2) Avail: NTIS HC A02/MF A01

This paper describes work in process in the investigation of the susceptibility of semiconductor devices to short pulses of microwave energy. This investigation includes a combination of testing, circuit modeling, and basic physics modeling. The testing includes both unipolar (video) and microwave (GHz range) pulses in the nanosecond time regime. Modeling is oriented toward the explanation of second breakdown phenomena and the development of a breakdown level prediction model. Preliminary results have been obtained for the 2N918 transistor. DOE

N83-30926# Brookhaven National Lab., Upton, N. Y.
A THEORY OF LOSSES AND LOSS MEASUREMENTS OF SUPERCONDUCTING POWER CABLES CONSISTING OF HELICALLY WOUND CONDUCTOR TAPES
F. Schauer 13 Dec. 1982 98 p refs
(Contract DE-AC03-76CH-00016)
(DE83-009874; BNL-51644; TIC-4500) Avail: NTIS HC A05/MF A01

The ac losses of short prototypes (up to 100 m) of superconducting cables are usually measured electrically by multiplying the cable currents with the corresponding voltage drops and time averaging the products in an electronic wattmeter. With this method the losses of different parts of a cable can be measured by using appropriate voltage pickup probes to measure (1) the overall cable voltage; (2) the axial voltage drops of the inner and outer conductors respectively; (3) the voltage drop of the surface of a conductor tape; and (4) the losses of the shorted end. The axial and spiral probes, and their functions are discussed. A theory of losses and loss measurements of superconducting power cables consisting of helically wound conductor tapes is given for the single helix cable, double helix cable, and double helix cables with metallic core and stabilizer layers. Theoretical results using this theory are compared with experimental data from testing a 1 m cable and a 100 m cable. DOE

N83-30927# Los Alamos Scientific Lab., N. Mex.
MEASUREMENT OF MEGAMPERE CURRENTS WITH OPTICAL FIBERS
L. Veeser, D. Kania, B. Freeman, P. Kruse, and E. Zimmerman 1983 7 p refs Presented at the Los Alamos Conf. on Optics '83, Santa Fe., N.Mex., 11-15 Apr. 1983
(Contract W-7405-eng-36)
(DE83-011168; LA-UR-83-1096; CONF-830425-9) Avail: NTIS HC A02/MF A01

Fiber optic sensors are routinely used to measure multi-megampere currents. The sensors are low noise, absolutely calibrated, and electrically decoupled from the pulsed power source. Polarized light from a HeNe laser is guided past the current carrier by a single-mode, low-birefringence fiber. The magnetic field from the current causes a Faraday rotation of the light polarization which is detected by a polarization analyzer and photodiode at the end of the fiber. A rotation of about 2500/MA + or - 5%, slightly less than the Verdet constant for non-birefringent silica glass was observed. It was found that highly birefringent (polarization preserving) optical fibers do not work in this application. The sensor is being ruggedized for field use with high-expolsive-driven current sources by using a diode laser and single mode fiber couplers to replace the laboratory system of lenses and spatial filters. DOE

N83-30928# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
ANALYSIS OF THE POTENTIAL OF THE ELECTROFLUID DYNAMIC WIND-DRIVEN GENERATOR
Richard Mitchell Jan. 1983 8 p refs Presented at the 6th Ann. ASME Tech. Conf., Orlando, Fla., 19-21 Apr. 1983
(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)
(DE83-005712; SERI/TP-211-1851; CONF-830405-10) Avail: NTIS HC A02/MF A01

The basic principle behind the electrofluid dynamic wind-driven generator is the use of an aerosol particle as the active element in a drag type wind energy conversion system. These particles (liquid drops or bubbles) are charged and carried by the wind into an electrical field which exerts on them an electrical force which is opposite of the wind direction. The particles extract the kinetic energy from the wind through the drag force exerted on them. Because an electrical field coupling is used, a minimum of moving parts is required. The analysis of a preliminary conceptual design of a full-scale generator established a range for the value indicators and an understanding of its optimization potential and uncertainty. The value indicators for the electrofluid dynamic concept are compared with those of several concentrational wind energy conversion systems. DOE

N83-30929# California Univ., Berkeley. Lawrence Berkeley Lab.
LOW-NOISE WIDE-BAND AMPLIFIERS FOR STOCHASTIC BEAM COOLING EXPERIMENTS
Branko Leskovar and C. C. Lo 5 Sep. 1982 18 p refs Presented at the Workshop on Beam Cooling, Stoughton Wisc., 9-11 Sep. 1982
(Contract DE-AC03-76SF-00098)
(DE83-007043; LBL-15238; CONF-820997-2) Avail: NTIS HC A02/MF A01

Noise characteristics of the continuous wave broadband amplifier systems for stochastic beam cooling experiments are presented. The noise performance, bandwidth capability and gain stability of components used in these amplifiers are summarized and compared in the 100 MHz to 40 GHz frequency range. This includes bipolar and field effect transistors, parametric amplifier, Schottky diode mixer and maser. Measurements of the noise characteristics and scattering parameters of variety GaAs FETs as a function of ambient temperature are also given. Performance data and design information are presented on a broadband 150-500 MHz preamplifier with noise temperature of approximately 350 K at ambient temperature of 200 K. Preamplifier stability based on scattering parameters concept is analyzed. DOE

N83-30930# Brown Boveri Electric, Inc., Chalfont, Pa.
METAL-OXIDE SURGE ARRESTERS FOR GAS-INSULATED SYSTEMS, PHASES 1 AND 2 Final Report
D. B. Miller and M. E. Potter (McGraw-Edison Co.) Feb. 1983 365 p refs
(EPRI Proj. 1421-1)
(DE83-901849; EPRI-EL-2876) Avail: NTIS HC A16/MF A01

A metal-oxide surge arrester for gas-insulated systems is contained in SF6 gas in an aluminum enclosure which is designed to connect directly to a port in a gas-insulated substation. A technique was developed for soldering metal oxide varistor (MOV) blocks together for strength and simplicity in assembly. Three 362kV prototype arresters were assembled, each using three parallel columns of these soldered 50-mm blocks. Continuous testing for 72 h at a-c voltage in the range of 209 V to 285 kV confirmed the predicted operation and thermal stability of this prototype design. The behavior of this arrester in typical power systems applications are shown by computer calculations for lightning surges and switching operations. The expected effects of seismic activity and internal fault arcs are also derived. Basic characteristics of gas-insulated metal-oxide arresters for 69 kV, 138 kV, 230 kV and 500 kV were also derived. DOE

N83-30931# Tennessee Valley Authority, Chattanooga. Power System Operations Office.
USE OF OSCILLOGRAPH RECORDS FOR ANALYZING SYSTEM PERFORMANCE
John R. Boyle 1983 28 p refs
(DE83-901682; TVA/OP/OPS-83/1) Avail: NTIS HC A03/MF A01

Protection of present-day power systems is accomplished by a complex system of extremely sensitive relays that function only during a fault. Because relays are extremely fast, automatic oscillographs installed at convenient locations can be used successfully to determine the performance of protective equipment during abnormal conditions. DOE

N83-30932# Bendix Corp., Kansas City, Mo.
VISUAL-RESPONSE INDICATOR FOR BAR-CODE-READER INPUT Final Report
J. R. Harte Mar. 1983 15 p
(Contract DE-AC04-76DP-00613)
(DE83-009149; BDX-613-2829) Avail: NTIS HC A02/MF A01

A prototype visual response indicator was designed, built, and tested. The indicator is designed to work in conjunction with a bar code reader for inputting data to the computer Aided Cable Tracking and Updating System. The indicator was tested using simulated production operations and was found to meet all design specification requirements. DOE

N83-30933# California Univ., Berkeley. Lawrence Berkeley Lab.
DESIGN OF A 10-T SUPERCONDUCTING DIPOLE MAGNET USING NIOBIUM-TIN CONDUCTOR
C. Taylor, R. Meuser, S. Caspi, W. Gilbert, W. V. Hassenzahl, C. Peters, R. Schafer, and R. Wolgast Nov. 1982 5 p ref Presented at the Appl. Superconductivity Conf., Knoxville, Tenn., 28 Nov. - 3 Dec. 1982 Submitted for publication
(Contract DE-AC03-76SF-00098)
(DE83-005931; LBL-14434; CONF-821108-16) Avail: NTIS HC A02/MF A01

In order to minimize the size and cost of conventional facilities the dipole magnets for the next generation of particle accelerators must produce as strong a magnetic field as possible. Ten tesla seems to be a reasonable goal, and can be attained by using either niobium-tin conductor at 4.2 K or niobium-titanium at 1.8 K. The beam diameter in a multi-TeV accelerator, can in principle, be quite small, say 20 mm, depending on the design of the injection and extraction systems, and on beam cooling technology. Magnet cost is strongly dependent on bore diameter, so there is a strong incentive to minimize that. A 40-mm bore diameter - about 60-mm winding inside diameter is feasible and is a reasonable goal for initial research and development. For such a high field and small bore, there is an incentive to achieve a high overall current density in order to minimize the amount of superconductor. DOE

N83-30934# Argonne National Lab., Ill. Dept. of Electrical and Computer Engineering.
PROBABILISTIC APPROACH TO STABILITY ANALYSIS. VOLUME 1: MATHEMATICAL MODELS, COMPUTING METHODS, AND RESULTS Final Report
P. M. Anderson, A. Bose, K. J. Timo, and F. E. Villaseca Jan. 1983 462 p refs
(EPRI Proj. 1764-4)
(DE83-901466; EPRI-EL-2797-Vol-1) Avail: NTIS HC A20/MF A01

The objective of this project was to investigate the application of probabilistic methods for use in power system analysis and to develop preliminary computer methods for evaluating and testing. Power system stability has traditionally been evaluated using deterministic techniques. In this method of analysis the engineer selects a particular location on the network where he places a predetermined disturbance. The disturbance is programmed to exist for a given time, usually a few cycles, and the stability program solves the system response to this particular upset. The results transient behavior will permit the engineer to determine stability or instability, but gives no information regarding the likelihood of this result. Thus, any evaluation that involves a large expenditure to prevent this given instability must be tempered by judgement regarding its probability of occurrence. This project provides a means of evaluating both the stability and its probability of occurrence. There are many problems in this step into probabilistic evaluation. DOE

N83-30935# Sandia Labs., Albuquerque, N. Mex.
RECOVERY OF ELECTRON-SHEATH CURRENT IN MAGNETICALLY SELF-INSULATED TRANSMISSION LINES
J. T. Crow and G. D. Peterson Aug. 1982 12 p refs Presented at 10th Intern. Symp. on Discharges and Elec. Insulation in Vacuum, Columbia, S.C., 25 Oct. 1982
(Contract DE-AC04-76DP-00789)
(DE83-002148; SAND-82-1141C) Avail: NTIS HC A02/MF A01

Magnetically self-insulated lines operating at high electric field stress have a high percentage of the current flow in an electron sheath adjacent to the cathode. Recovery of the current in this sheath is desirable for efficient power transport. The Sandia National Laboratories HydraMITE accelerator has a magnetically insulated transmission line which has a 7.6 ohm geometric impedance, and operates at 4.8 ohm indicating that approximately 40% of the current flows in the electron sheath. An experiment was conducted on the HydraMITE machine in which input and output currents were measured on a section of line which the impedance changed smoothly from 7.6 ohm to 20 ohm. Measurements were made with a range of inductive and ressistive loads. The input and output currents were then compared to lumped circuit line simulations to separate losses related to inductance from electron sheath losses. DOE

N83-30936# Sandia Labs., Albuquerque, N. Mex.
GROWTH OF SILICON-ON-INSULATOR FILMS USING A LINE-SOURCE ELECTRON BEAM
J. A. Knapp and S. T. Picraux 1982 6 p refs Presented at the 6th Intern. Symp. on the Sci. Basis for Radioactive Waste Management, Boston, 1 Nov. 1982
(Contract DE-AC04-76DP-00789)
(DE83-003187; SAND-82-1472C; CONF-821107-19) Avail: NTIS HC A02/MF A01

A swept line source electron beam was used to study unseeded Si on insulator crystallization at beam scan speeds of 150 to 1500 cm/s. For a particulaar sample configuration a maximum linear crystallization velocity of approximately 350 cm/s was observed. At higher sweep speeds, competing nucleation occurred at intervals across the film. Both the limit in crystallization velocity and the intervals between nucleation are tentatively explained by a simple model. DOE

N83-30937# Research Inst. of National Defence, Linkoeping (Sweden). Dept. 3.
HIGH FREQUENCY MIXERS
Aake Bergquist Feb. 1983 74 p refs In SWEDISH; ENGLISH summary
(FOA-C-30313-E) Avail: NTIS HC A04/MF A01; Research Institute of National Defence KR 50

Mixer technology particularly at very high frequencies, and the basic function of single, push-pull, and subharmonically pumped mixers are reviewed. The performance of a single-balanced mixer in the 35 GHz band is discussed. Mixing attenuation, noise factor, and the influence of noise temperature are dealt with. A noise measurement device is described. Author (ESA)

N83-30938# Accumulatorenfabriken Wilhelm Hagen A.G., Soest (West Germany). Zentrallab.
DEVELOPMENT OF A STATIONARY BATTERY FOR HIGH LOAD WITH INCREASED EFFICIENCY FOR LOAD LEVELING Final Report, Feb. 1982
Reiner Kiessling Bonn Bundesministerium fuer Forschung und Technologie Mar. 1983 110 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-016; ISSN-0340-7608) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 23

A lead acid battery with lower internal resistance and higher specific capacity than standard was designed. An alloy for the positive grid was developed. The technology for auxiliary systems for maintenance-free service, i.e., recombination, acid circulating, electrical acid density measuring, and acid level indication was tested. The optimum design is a module of five cells. A computer controlled pilot plant with a maximum output of 250 kW and a 2.2 hr duty time was put into service. Author (ESA)

N83-30939# Siemens A.G., Munich (West Germany). Unterhenmensbereich Bauelemente.
GALLIUM ARSENIDE INTEGRATED CIRCUITS FOR PROFESSIONAL BROADBAND APPLICATIONS UP TO 3 GHz APPROXIMATELY Final Report, Apr. 1982
Herbert Weidlich, Ewald Pettenpaul, and Felix Anton Petz Bonn Bundesministerium fuer Forschung und Technologie Mar. 1983 107 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-023; ISSN-0340-7608) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 22,50

A GaAs-FET-technology for the manufacture of fast GaAs broadband IC's was developed with: local ion implantation for the channel and the contact region; Si3N4 cap for annealing and in process surface protection; gold based metallizations in a modified lift-off technique; and a second Si3N4 layer on top of the metallizations for safe enclosure of the active areas and as dielectric for metal insulator metal coupling capacitors. The gains with this technology approximate those of the silicon planar technology. An antenna amplifier with 20 dB gain from 40 to 1000 MHz and a noise figure of about 4 dB was tested in different modifications with integrated load transistors and with external load inductors. The stages are cascadable without matching, so higher gains are possible. An amplifier for measurement equipment with 2 GHz bandwidth and 16 dB gain was constructed with selected antenna amplifier samples using real load resistors. Monolithic integrated differential amplifier stages show gain factors of up to 35 dB with 22 MHz 3 dB-bandwidth suitable for a 2 stage operational amplifier with < dB gain and 14 MHz bandwidth.
Author (ESA)

N83-30940# AEG-Telefunken, Heilbronn (West Germany). Geschaeftsbereich Elektronische Bauelemente.
NEW TECHNOLOGY FOR ULTRAHIGH FREQUENCY INTEGRATED CIRCUITS Final Report, Mar. 1982
Juergen Meyer and Klaus Woerner Bonn Bundesministerium fuer Forschung und Technology Apr. 1983 101 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-060; ISSN-0340-7608) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 21,50

A high volume production of ultrahigh frequency integrated curcuits with minimum cost was achieved with a three-fold increase of the batch size and the establishment of a production line for wafers with 75 mm diameter., A frequency divider with preamplifier was developed. Oxide isolation, two layer metallization, and epitaxy methods were studied. Maximum input frequencies of divider stages is 1,5 GHz. The integrated transistors have cutoff frequencies of 6 GHz with base transit times of 16 psec (corresponding 10 GHz). Packing density is doubled; power dissipation is reduced by a factor of 3. Author (ESA)

N83-30941# Valvo G.m.b.H., Hamburg (West Germany). Produktbereich MOS-ICS
SURFACE PASSIVATION IN VLSI TECHNOLOGY Final Report, Oct. 1981
Michael Bellersen Bonn Bundesministerium fuer Forschung und Technologie Mar. 1983 106 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-080; ISSN-0340-7608) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 26,50

A surface protection for integrated circuits based on plasma deposited Si3N4 was developed with the plasma nitride reactor AMP 3300 II. The deposition conditions and the safety of the reactor were optimized. The reaction mechanism regarding the layer quality influenced by the process parameters was investigated. The step coverage of the layer is < 60%, the refraction index 2,0 + or - 0,02 and the etch rate in buffered HF > 200 A/min. The compressive stress amounts to 10 billion ayn/cm sq and the pinhole density is < 0,5/cm sq. The quality of the nitride layer and of the MOS-circuits was investigated in stress tests. Control procedures for passivation layers were developed and others improved. The life test results for THB are good. Author (ESA)

N83-30942# Sheffield Univ. (England). Dept. of Control Engineering.
WIDE-BEAM SENSORS FOR CONTROLLING DUAL-DELAY SYSTEMS
J. B. Edwards and J. K. Twemlow Sep. 1982 26 p refs Submitted for publication
(RR-197) Avail: NTIS HC A03/MF A01

A class of dual delay feedback systems of open loop transfer function G(s) = k exp(-Xs)/[I - exp(-Ws)] is shown to be unstable if ratio X/W is noninteger. By means of z-transform techniques it is shown that, by using a feedback transducer that senses over a substantial distance either side of its central axis, closed-loop stability may be restored. Such transducers, termed widebeam sensors, include transmission, backscatter and natural radiation types as well as electromechanical conveyor belt weighers. Designing transducers for very narrow beams may not be desirable from the overall system viewpoint. Author (ESA)

N83-30943# Sheffield Univ. (England). Dept. of Control Engineering.
ON NONLINEAR PERTURBATIONS OF NONLINEAR DYNAMICAL SYSTEMS AND APPLICATIONS TO CONTROL
S. P. Banks Oct. 1982 21 p refs
(RR-199) Avail: NTIS HC A02/MF A01

The nonlinear variation of constants formula is generalized to infinite dimensional systems and applied to the stability problem and to obtain bounds on the states of a nonlinear control system when the controls are bounded. It is shown that the given formula has applications in stability and nonlinear control theory and, possibly, to nonlinear controllability. The theory is illustrated by a simple model from nuclear reactor dynamics. Author (ESA)

N83-30944# Indian Electrical Mfrs. Association, Bombay.
PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON TRANSFORMERS: TECHNICAL PAPERS
Mar. 1982 329 p refs Proc. held at New Delhi, 5-9 Feb. 1982
(PB83-168740;) Avail: NTIS HC A15/MF A01 CSCL 09A

The current status and future trend of technological developments in transformers and reactors are discussed in 23 papers. The main subjects covered are: technology developments in materials; design aspects; testing, quality assurance and operating experience; and special transformers and accessories. GRA

N83-30945# Indian Electrical Mfrs. Association, Bombay.
PROCEEDINGS OF THE INTERNATIONAL SEMINAR ON CAPACITORS
Dec. 1982 175 p refs Proc. held at Bombay, 9-10 Dec. 1982
(PB83-168724) Avail: NTIS HC A08/MF A01 CSCL 09A

Technology developments in materials; design, manufacturing aspects and quality assurance, capacitor applications and users' problems; and electronic and other capacitors are discussed in 21 technical papers. GRA

N83-30946# Centre Technique des Industries Mecaniques, Senlis (France).
IMPROVING THE DESIGN AND CHARACTERISTICS OF ACOUSTIC TRANSDUCERS Final Report
J. Roget Feb. 1983 36 p refs Transl. into ENGLISH from the mono. "Amelioration de la Conception et de l'Utilisation des Capteurs d'Emission Acoustique" (France), Jun. 1981 33 p
(PB83-166652; CETIM-15-Y-041) Avail: NTIS HC A03/MF A01 CSCL 09A

The design of piezoelectric transducers was studied by comparing commercial ceramics, computing the resonance frequency, and studying electronic devices which use them. Nonpiezoelectric transducers were also studied, including an experimental condenser transducer and a commercial electret transducer. It is shown that piezoelectric transducers are the best adapted to detecting acoustic emission. Capacitive pickups can be used where frequency selectivity is a problem. GRA

N83-30947# National Bureau of Standards, Washington, D.C. Center for Radiation Research.
INTRODUCTION TO NOISE IN SOLID STATE DEVICES Final Technical Note
Julius Cohen Dec. 1982 67 p refs
(PB83-164970; NBS-TN-1169) Avail: NTIS HC A04/MF A01 CSCL 09A

The principal noises found in solid state devices, namely shot noise, thermal noise, 1/f noise, and generation-recombination noise are discussed. A systematic treatment of noise in selected solid state devices is presented. Analyses progress from a single noise source in a circuit element to four noises in a device; concomittantly equivalent circuits are developed to facilitate the solution of various complex noise problems. Examples treated in this part include resistors, rectifiers, transistors, and photo detectors. The work concludes with a recapitulation and useful references. GRA

N83-30948# Science Research Council, Chilton (England).
THE RAILCON ANODES FOR IMAGE PHOTON COUNTING FABRICATED BY ELECTRON BEAM LITHOGRAPHY
W. M. Burton Jan. 1982 15 p refs
(PB83-164806; RL-82-003) Avail: NTIS HC A02/MF A01 CSCL 09A

The Anger wedge and strip anode event location system was extended by the use of electron beam lithography (EBL) and computer aided design methods to develop several types of readout anodes of lithographic construction (RALICON) for use in photon counting microchannel plate imaging detectors. The designs include improved wedgestrip anodes for spectroscopic detectors, radial anodes for use in error detectors and anodes with circular symmetry and nonlinear response designed for specific interferometric applications. GRA

N83-30949# National Bureau of Standards, Washington, D.C. National Measurement Lab.
CHARACTERIZATION OF MICROWAVE WINDOW MATERIALS Interim Report, May - Oct. 1982
H. P. R. Frederikse, A. L. Dragoo, and A. H. Kahn Jan. 1983 26 p refs Prepared in cooperation with WRH Company, Poolesville, Md. Sponsored in part by DNA
(PB83-164350; NBSIR-83-2646) Avail: NTIS HC A03/MF A01 CSCL 09E

Boron nitride is a major candidate for use as a microwave window material. To assess its feasibility for this purpose, it is essential to know the electrical and dielectric properties at high temperatures. The experimental approach to electrical conductivity measurements above 1800 C and some initial results are presented. At the same time, computer calculations were performed which yielded values of the reflectivity, absorption, and transmission of boron nitride in the temperature range 2500 to 3000 C. GRA

N83-30950# National Electrical Engineering Research Inst., Pretoria (South Africa).
ELEK 243: THE DEVELOPMENT OF AN UNCOMMITTED INTEGRATED CIRCUIT FOR COMBINED DIGITAL AND ANALOGUE APPLICATIONS
A. J. Kemp Jun. 1982 225 p refs
(PB83-165399; CSIR-SR-ELEK-243; ISBN-0-7988-17143) Avail: NTIS HC A10/MF A01 CSCL 09E

The development and industralization of an uncommitted circuit for combined digital and analog applications is described. Integrated Injection Logic (12L) is used to realize digital functions, and standard analog techniques, based on a bipolar process, are used to realize analog functions. A novel architecture, as well as the use of three masks to realize a required interconnection pattern, results in a very high efficiency for the useful number of components. GRA

N83-30951# National Electrical Engineering Research Inst., Pretoria (South Africa).
SOME ANALOG INTEGRATED CIRCUIT BUILDING BLOCKS AND CIRCUIT TECHNIQUES
E. Seevinck Oct. 1981 56 p
(PB83-165423; CSIR-SR-ELEK-229; ISBN-0-7988-17119) Avail: NTIS HC A04/MF A01 CSCL 09E

The design of electronic circuits for integration, (particularly those of the analog variety) differs in some important respects from the techniques used for discrete circuits. The aim of this booklet is to provide several techniques which were found useful in this context and some of which are not well known. DOE

N83-30952# Clarkson Coll. of Technology, Potsdam, N.Y.
PROTECTION OF INTEGRATED CIRCUITS FROM ELECTRICAL TRANSIENTS Final Report
Rajan Raghaven and Henry Domingos 22 Jun. 1982 106 p refs Sponsored in part by Navy
(Contract F30602-78-C-0281)
(PB83-165845) Avail: NTIS HC A06/MF A01 CSCL 09E

The nature of the threat of integrated circuits from electrical transients in an operational environment are summarized. Sources of transients are described, and their effects on integrated circuits are discussed, and some observations on different approaches to protect circuits are made. GRA

N83-30953# Illinois Univ., Urbana-Champaign. Coordinated Science Lab.
AUTOMATIC TUNING ALGORITHMS AND STATISTICAL CIRCUIT DESIGN Ph.D. Thesis
Dale Edward Hocevar Jun. 1982 223 p refs
(Grants NSF ENG-78-11758; NSF ECS-80-22951)
(PB83-168120; UILU-ENG-82-2220; R-954) Avail: NTIS HC A10/MF A01 CSCL 09E

First three generalized tuning algorithms are comparatively reviewed on the basis of their architecture, computational complexity, and effectiveness. Also, a method is presented for the tuning resistor and frequency selection problem, a problem relevant to

all three methods. Secondly, Monte Carlo techniques for yield estimation and yield maximization of circuits are investigated. A quadratic approximation model is set up for the circuit and is used to achieve variance reduction in yield estimation and to provide an extrapolated yield approximation technique. GRA

N83-31173 Indian Inst. of Tropical Meteorology, Poona.
FREQUENT FAILURE OF LIGHTNING ARRESTERS AT THE SATPURA THERMAL POWER STATION, INDIA: PRELIMINARY RESULTS OF FIELD OBSERVATIONS
A. Mary Selvan, G. K. Manohar, L. T. Khemani, P. C. S. Devara, G. A. Momin, A. S. R. Murty, and Bh. V. Ramana Murty *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 7 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31179 Harris Corp., Melbourne, Fla.
A MODELING SYSTEM FOR CONDUCTED TRANSIENT ANALYSIS
Thomas L. Mahoney *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 10 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31181 Sagami Inst. of Tech., Fujisawa (Japan).
RELATIONS OF THE FLASHOVER VOLTAGE VERSUS THE VELOCITY OF THE MOVING ELECTRODE
Y. Nagai, T. Koide, and K. Kinoshita *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 8 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31185 Georgia Inst. of Tech., Atlanta.
EARTH ELECTRODES FOR GROUNDING NEMP TYPE LIGHTNING
David P. Millard *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 17 p refs (For primary document see N83-31163 19-47)
(Contract DNA001-80-C-0294)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31186 Federal Emergency Management Agency, Denver, Colo.
IMPROVED GROUNDING SYSTEM FOR MOUNTAIN TOP RADIO SITES
Lloyd B. Watts *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 4 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31187 Nis Univ. (Yugoslavia). Faculty of Electronics.
ELECTRICAL RESISTIVITY OF CONCRETE IN THE FOUNDATION EARTH
Aleksandar Vorgucic *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 4 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31194 Lightning Technologies, Inc., Pittsfield, Mass.
RECENT LIGHTNING INDUCED VOLTAGE TEST TECHNIQUE INVESTIGATIONS
Keith E. Crouch *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 19 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31215 Rockwell International Corp., Anaheim, Calif. Autonetics Strategic Systems Div.
USAGE OF THE SYSCAP II CIRCUIT ANALYSIS PROGRAM TO DETERMINE SEMICONDUCTOR FAILURE THRESHOLD LEVELS CAUSED BY LIGHTNING/EMP TRANSIENTS
D. L. Rusher and C. T. Kleiner *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 6 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31226 Les Cables de Lyon, Bezons (France). Div. H.F.
LIGHTNING PROTECTION DEVICES FOR HIGH FREQUENCIES EQUIPMENTS
Jean Pierre Simi *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 9 p (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31228 Tokyo Univ. (Japan). Inst. of Industrial Science.
FAST FIELD CHANGES PRODUCED BY POSITIVE GROUND STROKES
Masaru Ishii, Junichi Hojo, Tatsuo Kawamura, and Kazuo Fujikake (Tohoku Electric Power Co. Inc.) *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 7 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31229 Nagoya Univ., Toyokawa (Japan). The Research Inst. of Atmospherics.
ON THE OSCILLATING BIPOLAR RETURN STROKE CURRENT
Tosio Takeuti, Nobuyuki Takagi, and Minoru Nakano *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 11 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31241 Douglas Aircraft Co., Inc., Long Beach, Calif.
THE LIGHTNING SPARK BARRIER
M. P. Amason and M. C. Hofmeister *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 3 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N83-30954# British Library Lending Div., Boston Spa (England).
SOLUATION OF AXISYMMETRICAL PROBLEM OF THEORY OF PLASTIC FLOW BY METHOD OF FINITE ELEMENTS
V. I. Urazhdin and L. S. Urazhdina 14 Jun. 1983 7 p refs Transl. into ENGLISH from Izv. Vyssh. Ucheb, Zaved. Chern. Met. (USSR), no. 7, 1982 p 46-48
(BLL-M35021-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The method of finite elements is used in solving the axisymmetrical problem of plastic flow theory. A method is proposed for taking account of rate discontinuity at the angular points of the plastic region. The process of axisymmetrical closed-die forging is examined. The proposed procedure is recommended for practical application in engineering calculations. Author

N83-30955# British Library Lending Div., Boston Spa (England).
LIMITS TO THE USE OF ANGULAR COEFFICIENTS DETERMINED BY THE POLYSK METHOD
V. G. Goman and V. E. Krivosheev 1983 6 p ref Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved. Chern. Met. (USSR) p 124-126
(BLL-M-34941-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The Polyak 'taut threads' method for determining angular coefficients in heat exchange by radiation is considered. A relation is derived for determining the angular coefficient in a system of plane parallel bodies of finite dimensions, and the accuracy of the taut threads method for solving this problem is assessed.
Author

N83-30956 Prins Maurits Lab. TNO, Rijswijk (Netherlands).
CALCULATION OF CONVECTION HEAT LOSSES IN INTERIOR BALLISTIC PROCESSES [BEREKENING VAN CONVECTIEVE WARMTEVERLIEZEN BIJ INWENDIG BALLISTISCHE PROCESSEN]
J. L. J. Schols Jan. 1981 77 p refs In DUTCH
(Contract A76/KL/039)
(PML-1981-5; TDCK-76479) Copyright. Avail: Issuing Activity

Gas dynamic calculation models were developed for interior ballistics. The flow equations in the form of partial differential equations are numerically solved. Convective heat losses occurring during one shot are calculated. In a one dimensional model they are calculated using a heat transfer coefficient obtained by the empirical Colburn formula. In a two dimensional model the gas flow behind the projectile is assumed to consist of a nonviscous main flow to which a turbulent boundary layer is coupled. The convective heat transfer is calculated from empirical profiles of average axial velocity component and temperature, or from two dimensional flow equations in the turbulent boundary layer.
Author (ESA)

N83-30957*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AIR MODULATION APPARATUS Patent Application
D. T. Lenahan, R. J. Corsmeier, and A. P. Sterman, inventors (to NASA) Filed 25 Feb. 1981 18 p
(NASA-Case-LEW-13524-1; US-Patent-Appl-SN-238257) Avail: NTIS HC A02/MF A01 CSCL 20D

An air modulation apparatus, such as for use in modulating cooling air to the turbine section of a gas turbine engine includes a valve means disposed around an annular conduit, such as a nozzle, in the engine cooling air circuit. The valve means, when in a closed position, blocks a portion of the conduit, and thus reduces the amount and increases the velocity of cooling air flowing through the nozzle. The apparatus also includes actuation means, which can operate in response to predetermined engine conditions, for enabling opening and closing of the valve. NASA

N83-30958*# Old Dominion Univ., Norfolk, Va.
GOERTLER INSTABILITY IN COMPRESSIBLE BOUNDARY LAYERS ALONG CURVED SURFACES WITH SUCTION AND COOLING Final Report
Nabil El-Hady and Alok K. Verma Washington NASA Apr. 1982 119 p refs
(Grant NsG-1645)
(NASA-CR-3544; NAS 1.26:3544) Avail: NTIS HC A06/MF A01 CSCL 20D

The Goertler instability of the laminar compressible boundary layer flows along concave surfaces is investigated. The linearized disturbance equations for the three-dimensional, counter-rotating streamwise vortices in two-dimensional boundary layers are presented in an orthogonal curvilinear coordinate. The basic approximation of the disturbance equations, that includes the effect of the growth of the boundary layer, is considered and solved numerically. The effect of compressibility on critical stability limits, growth rates, and amplitude ratios of the vortices is evaluated for a range of Mach numbers for 0 to 5. The effect of wall cooling and suction of the boundary layer on the development of Goertler vortices is investigated for different Mach numbers. Author

N83-30959*# Pratt and Whitney Aircraft Group, East Hartford, Conn.
AEROTHERMAL MODELING PROGRAM, PHASE 1 Final Report, Jul. 1982 - May 1983
Geoffrey J. Sturgess Jul. 1983 190 p refs
(Contract NAS3-23524)
(NASA-CR-168202; NAS 1.26:168202; PWA-5907-19) Avail: NTIS HC A09/MF A01 CSCL 20D

The physical modeling embodied in the computational fluid dynamics codes is discussed. The objectives were to identify shortcomings in the models and to provide a program plan to improve the quantitative accuracy. The physical models studied were for: turbulent mass and momentum transport, heat release, liquid fuel spray, and gaseous radiation. The approach adopted was to test the models against appropriate benchmark-quality test cases from experiments in the literature for the constituent flows that together make up the combustor real flow. Author

N83-30960*# Purdue Univ., Lafayette, Ind. Thermal Sciences and Propulsion Center.
STAGNATION REGION GAS FILM COOLING: EFFECTS OF DIMENSIONLESS COOLANT TEMPERATURE Final Report
M. A. Bonnice and M. R. LEcuyer Jul. 1983 192 p refs
(Grant NsG-3071)
(NASA-CR-168197; NAS 1.26:168197) Avail: NTIS HC A09/MF A01 CSCL 20D

An experimental investigation was conducted to mode the film cooling performance for a turbine vane leading edge using the stagnation region of a cylinder in cross flow. Experiments were conducted with a single row of spanwise angled (25 deg) coolant holes for a range of the coolant blowing ratio and dimensionless coolant temperature with free stream-to-wall temperature ratio approximately 1.7 and Re sub D = 90000. the cylindrical test surface was instrumented with miniature heat flux gages and wall thermocouples to determine the percentage reduction in the Stanton number as a function of the distance downstream from injection (x/d sub 0) and the location between adjacent holes (z/S). Data from local heat flux measurements are presented for injection from a single row located at 5 deg, 22.9 deg, 40.8 deg, from stagnation using a hole spacing ratio of S/d = 5. The film coolant was injected with T sub c < T sub w with a dimensionless coolant temperature in the range 1.18 < or equal to theta sub c < or equal to 1.56. The data for local Stanton Number Reduction (SNR) showed a significant increase in SNR as theta sub c was increased above 1.0. Author

N83-30961# Case Western Reserve Univ., Cleveland, Ohio. Inst. of Technology.
THE EFFECT OF BODY FORCES ON THE MOTION AND HEAT TRANSFER OF CONFINED FLUIDS Final Scientific Report, 1 Nov. 1980 - 30 Nov. 1982
Simon Ostrach 31 Mar. 1983 16 p refs
(Grant AF-AFOSR-0045-81; AF Proj. 2307)
(AD-A127368; AFOSR-83-0273TR) Avail: NTIS HC A02/MF A01 CSCL 20/4

The research performed under the subject dealt with two problems in which body forces lead to complex flows which are of scientific and technological importance. The first of these is concerned with the central unresolved problem of flows in completely confined enclosures, viz., that it is not possible to predict the flow pattern a priori for a specified geometric configuration and imposed boundary conditions. The second problem is an external one in which there is an interaction of hydrodynamic (Taylor-Gortler) and thermal (Rayleigh-Bernard) instabilities.
Author (GRA)

N83-30962# Massachusetts Inst. of Tech., Cambridge. Dept. of Mechanical Engineering.
INTEGRATED COMPONENT FLUIDIC SERVOVALVES AND POSITION CONTROL SYSTEMS Final Contractor Report, 1979 - 1982

D. N. Wormley and K.-M. Lee Adelphi, Md. HDL Apr. 1983 86 p refs
(Contract DAAK21-79-C-0158; DA Proj. 1L1-61102-AH-44; HDL Proj. A44934)
(AD-A127362; HDL-CR-82-158-1) Avail: NTIS HC A05/MF A01 CSCL 20/4

The operating characteristics of fluidic laminar proportional amplifier (+PA's) operating on hydraulic oil have been determined as a function of pressure and temperature. The useful operating range of these elements has been defined for application in multistage gain blocks and summing amplifiers. An operational servovalve constructed from LPA's has been developed and coupled with a fluidic position feedback transducer, summing amplifier and ram to construct a closed loop position control system. Static and dynamic experimental evaluation of the servosystem has shown that its performance is comparable to that of a servo employing electrohydraulic components. This development effort has demonstrated the capability to develop high performance, closed loop servo components from standard, integrated component fluidic elements. Author (GRA)

N83-30963# University Coll. of Wales, Aberystwyth. Dept. of Physics.
THE BEHAVIOUR OF DETONATION WAVES IN SINGLE PHASE HETEROGENEOUS SYSTEMS Interim Scientific Report, 30 Sep. 1981 - 29 Sep. 1982
D. H. Edwards 20 Nov. 1982 20 p refs Sponsored in part by EOARD
(Grant AF-AFOSR-0247-81)
(AD-A126897; AFOSR-83-0198TR; ISR-1) Avail: NTIS HC A02/MF A01 CSCL 19/4

Most studies on the ignition and propagation of detonation waves are carried out with systems of uniform composition. However, fuel/air clouds, whether they are produced accidentally or deliberately, will exhibit varying degrees of inhomogeneity. The manner in which both flames and detonation waves propagate in such clouds has received scant attention in the past largely because of the difficulties, both experimental and theoretical, which such problems present. Because of the lack of information on the influence of gradients on wave behavior it is often tacitly assumed in hazard analyses that the presence of concentration gradients will hamper rather than enhance the propagation of a detonation wave; but this assumption is by no means proven. The present study therefore aims at elucidating the fundamental mechanisms which control the behavior of detonations in the presence of compositional variations. Author (GRA)

N83-30964# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
PERFORMANCE OF A VARIABLE CONDUCTANCE HEAT PIPE HEAT EXCHANGER Final Scientific Report, 15 May 1982 - 14 Feb. 1983
Paul D. Chancelor Feb. 1983 61 p refs
(Grant AF-AFOSR-0205-82; AF Proj. 2301)
(AD-A126861; EOARD-TR-83-8) Avail: NTIS HC A04/MF A01 CSCL 13/1

The performance of an air to air heat exchanger in which heat is transferred to a finned evaporator and from a finned condenser via a heat pipe was evaluated. The variable conductance heat pipe is to the condenser fins a heat source and to the evaporator fins a heat sink. The principal advantage of the variable conductance heat pipe heat exchanger is the ability to modulate power transfer independent of stream inlet conditions. This type of heat exchanger is of particular interest to the commercial aircraft industry because of its control system. The results from this research will help to provide the engineer with experimental data necessary to design a full scale prototype heat exchanger to be tested in situ. Author (GRA)

N83-30965# Physical Sciences, Inc., Andover, Mass.
MODEL FOR HIGH-SPEED INTERACTION HEATING Annual Report, 1 Oct. 1981 - 30 Sep. 1982
H. H. Legner and M. L. Finson Dec. 1982 23 p refs
(Contract F49620-80-C-0015; AF Proj. 2307)
(AD-A127250; AFOSR-83-0229TR; PSI-TR-359) Avail: NTIS HC A02/MF A01 CSCL 20/4

A boundary-layer model with application to high-speed flow separation in compression corner geometries is described. Integration through regions of separating/reattaching flow is facilitated through the use of an inverse boundary layer procedure that computes the pressure gradient for a given boundary-layer displacement thickness and displacement mass flow. Comparisons with Navier-Stokes calculations for a confined separated flow, using the Reyhner-Flugge-Lotz approximation in the reverse flow region, are good and have served to validate the boundary-layer approach. The viscous-inviscid interaction occurring in these flows are accounted for with the physically-sound coupling scheme developed recently by Wigton and Holt. A specific algorithm for hypersonic shock wave boundary-layer interactions is developed using the Newtonian flow approximation. Future calculations appropriate to laminar and turbulent compression corner experimental data are outlined. Author (GRA)

N83-30966# Naval Research Lab., Washington, D. C. Fluid Dynamics Branch.
AN INTERACTIVE COMPUTER CODE FOR WATER WAVES IN OPEN CHANNELS Interim Report
N. C. Chu and G. A. Keramidas 13 Apr. 1983 33 p refs
(RR0230141)
(AD-A127424; NRL-MR-5066) Avail: NTIS HC A03/MF A01 CSCL 09/2

A computational model has been developed for the simulation of water waves in open channels. The model numerically solves a set of partial differential equations known as the Shallow Water equations. The method employed for the solution of these equations is the Finite Element Method with linear element approximations in time and space. The computer code was initially developed for the computational model on a HP-1000 computer system. This report contains the interactive version of the computer code, its description and provides information on how the code can be used. Author (GRA)

N83-30967# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AN EXPERIMENTAL STUDY INTO THE SCALING OF AN UNSWEPT-SHARP-FIN-GENERATED SHOCK/TURBULENT BOUNDARY LAYER INTERACTION M.S. Thesis Princeton Univ.
William B. McClure Jan. 1983 123 p refs
(AD-A126919; AFIT-CI-NR-83-6T) Avail: NTIS HC A06/MF A01 CSCL 20/4

An experimental study was carried out of the three-dimensional shock wave/turbulent boundary layer flow-field generated by sharp fin with an unswept leading edge at a 10 deg angle-of-attack to the incoming flow. The model was mounted on and normal to either the tunnel floor or a horizontal flat plate. Both tests surfaces generated a fully developed, equilibrium turbulent boundary layer, with incoming thicknesses of 1.29 cm. and .45 cm., respectively. The incoming freestream was at a nominal Mach number of 2.95 and a Reynolds number of 6.3 x 10 to the 7th power/meter. All surfaces were near adiabatic wall temperature. The three objectives of this study were to learn more about the structure of this type of interaction, to examine the scaling of the resulting flow-field, and to obtain a detailed data set with which to compare numerical computations. The results show that the scaling of this type of interaction is dependent upon both local boundary layer thickness and freestream Reynolds number. GRA

N83-30968# Shannon Engineering, Seattle, Wash.
FEASIBILITY OF ESTABLISHING A CORRELATION BETWEEN BOUNDARY LAYER GROWTH AND UPSTREAM SHOCK CONDITIONS Final Report, 16 Apr. - 30 Sep. 1982
Ole Leth and Jack Shannon 30 Sep. 1982 28 p refs
(Contract F49620-82-C-0059; AF Proj. 2307)
(AD-A126909; AFOSR-83-0196TR; JS1109; FQ8671-00878) Avail:

NTIS HC A03/MF A01 CSCL 20/4

Data suitable for drag correlations studies were identified. No single data set or combination thereof were found to be adequate for analytic treatment. It is concluded that the technique of simulating higher Reynolds' number effects by boundary layer transition strips is unsuitable for drag correlation studies. An economical test sequence using existing airfoil types in high Reynolds' number tunnels is recommended. GRA

N83-30969# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. Dept. of Aeronautics and Astronautics.

NUMERICAL INTEGRATION OF NONEQUILIBRIUM INTERNAL FLOW USING EULER EQUATIONS M.S. Thesis MIT

Martin John Trout Feb. 1983 127 p refs

(AD-A126907; AFIT-CI-NR-83-8T) Avail: NTIS HC A07/MF A01 CSCL 20/4

A quasi-one dimensional, nonequlibrium, streamtube model and finite difference computer code has been developed to study nonisentropic supercritical, real gas flows. A system of unsteady Euler equations is integrated to a steady state solution utilizing MacCormack's explicit/implicit numerical scheme. Implicit characteristic boundary conditions are employed at the subsonic inlet to enable automatic solution of inlet conditions consistent with the critical mass flow rate. A numerical damping technique for the explicity evaluated reaction rate has been developed such that nonequilibrium flows with large reaction rate coefficients have been solved numerically with significant reduction in computation time. GRA

N83-30970# California Univ., Livermore. Lawrence Livermore Lab. Earth Sciences Dept.

PARTICLE-DYNAMICS CALCULATIONS OF SHEAR FLOW

Otis R. Walton Aug. 1982 13 p refs Presented at US-Japan Seminar on New Models and Constitutive Relations in the Mech. of Granular Mater., Ithaca, N.Y., 22 Aug. 1982 Submitted for publication

(Contract W-7405-eng-48)

(DE83-005446; UCRL-88560; CONF-820843-3) Avail: NTIS HC A02/MF A01

Two dimensional discrete particle computer models are described. The soft particle approach allows them to be applied over a wide range of conditions from static situations through rapid shear conditions. Surface friction between particles and with boundary walls is explicitly modeled. The modeling of dynamic situations wherein the energy losses and momentum transfer during interparticulate collisions play important roles is emphasized. The numerical techniques are verified and direct comparison with physical tests involving several particles have verified the models' ability to calculate the motion of real materials. Direct shear tests on oil shale rubble and corresponding calculations indicate qualitatively similar circulation phenomena and both show large fluctuations in the magnitude of the shearing force. Incline chute flow calculations provide descriptions of individual particle paths in which shearing and size segregation phenomena are observed. DOE

N83-30971# CHAM of North America, Inc., Huntsville, Ala.

VERA2D: PROGRAM FOR 2-D ANALYSIS OF FLOW, HEAT AND MASS TRANSFER IN EVAPORATIVE COOLING TOWERS. VOLUME 1: MATHEMATICAL FORMULATION, SOLUTION PROCEDURE AND APPLICATIONS Final Report

A. K. Majumdar, A. K. Singhal, and D. B. Spalding Mar. 1983 107 p refs Sponsored by EPRI

(EPRI Proj. 1261-1)

(DE83-901966; EPRI-CS-2923-Vol-1) Avail: NTIS HC A06/MF A01

VERA2D is a computer program for steady two-dimensional analysis of flow, heat, and mass transfer in wet cooling towers. The code is written in FORTRAN IV language and is applicable to the following types of towers: (1) mechanical draft crossflow; (2) mechanical draft counterflow; (3) natural draft crossflow; and (4) natural draft counterflow. The description of VERA2D has been provided in two volumes. Volume 1 describes the mathematical formulation, solution procedure, and several applications of the code. Some overall features of the code such as capabilities and limitations are described in both the volumes. DOE

N83-30972# Solar Turbines International, San Diego, Calif.

CERAMIC-HEAT-EXCHANGER TECHNOLOGY Final Report

M. E. Ward and A. J. Kubasco Mar. 1983 103 p refs Sponsored by Electric Power Research Inst.

(DE83-901832; EPRI-AP-2883) Avail: NTIS HC A06/MF A01

Technology for pressurized, high temperature, ceramic tube heat exchangers was established by environmental, design, and fabrication studies. The design study includes the finite element stress analysis of the ceramic components contained in the DOE ceramic heat exchanger test module. This test module contains 28, 4.56-m long ceramic tubes with a 11.43-cm dia ceramic header. It was operated successfully for 125 h up to firing temperatures of 17000K (26000F) and outlet air temperatures of 15330K (23000F) at 689.4 kPa (100 psia). This unit was then fired with a pulverized coal burner under EPRI sponsorship for 25 h. DOE

N83-30973# Sandia Labs., Albuquerque, N. Mex.

NATURAL-CONVECTION EXPERIMENTS IN A LIQUID-SATURATED POROUS MEDIUM BOUNDED BY VERTICAL COAXIAL CYLINDERS

D. C. Reda Mar. 1983 54 p refs

(Contract DE-AC04-76DP-00789)

(DE83-007469; SAND-82-0793) Avail: NTIS HC A03/MF A01

An experimental effort is presently underway to investigate natural convection in liquid saturated porous media utilizing a geometry, and hydrodynamic/thermal boundary conditions, relevant to the problem of nuclear waste isolation in geologic repositories. Detailed measurements were made of the steady state thermal field throughout an annular test region boundary by a vertical, constant heat flux, inner cylinder and a concentrically placed, constant temperature, outer cylinder. An overlying constant pressure, fluid layer was utilized to supply a permeable upper surface boundary condition. Results showed the heater surface temperature to increase with increasing vertical distance due to the buoyantly driven upflow. The measured temperature difference (delta T) between the average heater surface temperature and the constant outer surface temperature was found to be progressively below the straight line/conduction only solution for delta T vs. power input as the latter was systematically increased. DOE

N83-30974# Argonne National Lab., Ill. Reactor Analysis and Safety Div.

HYDRODYNAMICS OF ANNULAR-DISPERSED FLOW

M. Ishii and I. Kataoka 1982 36 p refs Presented at the ASME Pressure Vessel and Piping Conf., Orlando, Fla., 27 Jun. - 2 Jul. 1982

(Contract W-31-109-eng-38)

(DE83-007625; CONF-820601-24) Avail: NTIS HC A03/MF A01

The interfacial drag, droplet entrainment, and droplet size distributions are important for detailed mechanistic modeling of annular dispersed two phase flow. In view of this, recently developed correlations for these parameters are presented and discussed. The drag correlations for multiple fluid particle systems were developed from a similarity hypothesis based on the mixture viscosity model. The results show that the drag coefficient depends on the particle Reynolds number and droplet concentration. The onset on droplet entrainment significantly alters the mechanisms of mass, momentum, and energy transfer between the film and gas core flow as well as the transfer between the two-phase mixture and the wall. By assuming the roll wave entrainment mechanism, the correlations for the amount of entrained droplet as well as for the droplet size distribution were obtained from a simple model in collaboration with a large number of data. DOE

N83-30975# Argonne National Lab., Ill.

EXPERIMENTS AND PROCEDURES FOR BOTTOM-HEATING HEAT-TRANSFER EXPERIMENTS THROUGH UO2 DEBRIS BEDS IN SODIUM

E. S. Sowa, D. R. Pedersen, J. Pavlik, and R. Purviance 1982

6 p refs Presented at the PAHR Inform. Exchange Conf., Karlsruhe, West Germany, 28 Jul. 1982
(Contract W-31-109-eng-38)
(DE83-008649; CONF-820717-5) Avail: NTIS HC A02/MF A01

Real materials experiments in heat transfer through beds of UO2 in sodium have been performed at Argonne National Laboratory over a period of years. The most recent method utilizes the resistive heating in a sheet tungsten filament located at the base of the debris container. A schematic diagram of the apparatus is shown. The tungsten is clamped between two water cooled copper electrodes. The filament is a sheet of tungsten 0.15 mm thick, 5 cm wide and 18 cm long. Two 6.5 mm thick sheets of boron nitride sandwich the filament. The upper face of the upper boron nitride sheet is in intimate contact with the bottom of the debris container. Temperatures are measured at various levels in the bed as well as in the boron nitride plate. In addition, the sodium pool temperature is measured by the thermocouple. The heat transferral through the bed is measured by the temperature difference and mass flowrate in a NaK condenser located above the debris bed. The NaK inlet and outlet temperatures are recorded individually, as well as, differentially. DOE

N83-30976# Los Alamos Scientific Lab., N. Mex.
CONTAINMENT CONDENSING HEAT TRANSFER
R. G. Gido and A, Koestel 1983 25 p refs Presented at 2nd Intern. Topical Meeting on Nucl. Thermalhydraulics, Santa Barbara, Calif., 11 Jan. 1982
(Contract W-7405-eng-36)
(DE82-018448; LA-UR-82-1759) Avail: NTIS HC A02/MF A01

A mechanistic heat transfer model that is valid for large scale containment heat sinks was presented. The model development is based on the determination that the condensation is controlled by mass diffusion through the vapor-air boundary layer, and the application of the classic Reynolds' analog to formulate expressions for the transfer of heat and mass based on hydrodynamic measurements of the momentum transfer. As a result, the analysis depends on the quantification of the shear stress (momentum transfer) at the interface between the condensate film and the vapor-air boundary layer. In addition, the currently used Tagami and Uchida test observations and their range of applicability are explained. DOE

N83-30977# California Univ., Livermore. Lawrence Livermore Lab.
PARTITIONING OF ATMOSPHERIC PARTICLE-IN-CELL MODELS TO MULTIPROCESSORS Ph.D. Thesis
Bryan Steven Lawver Sep. 1982 116 p refs
(Contract W-7405-eng-48)
(DE83-004409; UCRL-53374) Avail: NTIS HC A06/MF A01

A design methodology for developing a multiprocessor computer system to solve atmospheric Particle in Cell models was formulated. The atmospheric Particle in Cell model is a subset of the class of fluid dynamics problems called Particle in Cell (PIC). The PIC class of problems requires very large data arrays to track the flow of mass through a two or three dimensional mesh and is computationally quite intensive. The two atmospheric pollution problems examined by this thesis are relatively simple three dimensional PIC problems, yet are very expensive to compute. The data storage requirements of these models are met by the very large memory that is common to multiprocessor systems. The hardware components of the multiprocessor system are microcomputers with memory mapping. Five processors are configured as a Master/Slave multiprocessor. By distributing the particles equally to each of the slave processors, the work is balanced and maximal throughput is achieved. DOE

N83-30978# Oxford Univ. (England). Engineering Lab.
NOISE GENERATION IN CAVITATING FLOWS Final Report
R. E. Franklin and J. McMillan 1983 10 p refs
(Contract ERC/9/4/2057/070)
(OUEL-1455/83) Avail: NTIS HC A02/MF A01

Measurements of the pressure fluctuations in the near field of a submerged jet are reported. The mechanisms by which the pressure fluctuations are generated are discussed, and the transient oscillations of microbubbles of air excited by the pressure drop in the nozzle, and the cavitation of microbubbles by the turbulent pressure fluctuations in the jet mixing region are estimated. The power spectral density of pressure fluctuations shows a broad flat peak at higher frequencies, rising steadily with velocity. When a critical cavitation number is reached the noise radiated from the collapse of the cavitation bubbles in the mixing region is detected and inception is defined. Below inception this noise component shows a sharp peak which first rises very rapidly and then in proportion to the cavitation number. Author (ESA)

N83-30979# Technical Research Centre of Finland, Espoo. Nuclear Engineering Lab.
EXPERIMENTS ON HEAT TRANSFER CRISIS AND HYDRAULIC RESISTANCE IN A 19 ROD BUNDLE
N. V. Tarasova (All-Union Dzerdzinsky Heat Engineering Inst., Moscow), V. I. Kisina (All-Union Dzerdzinsky Engineering Inst., Moscow), T. A. Vanttola, and O. M. Tiihonen Feb. 1983 72 p refs
(VTT-RR-154; ISBN-951-38-1683-4; ISSN-0358-5077) Avail: NTIS HC A04/MF A01

A dryout heat transfer crisis was simulated using a 1.5 MW thermal hydraulic loop. Crisis occurrence was independent of heat flux in the large steam qualities and small mass fluxes. No crisis correlation predicted this phenomenon, but the GE and the Hsu-Beckner formulas obtain similar values to those of the experiments. In slow flow decay transients the crisis appears later than in stationary experiments. Single phase heat transfer coefficient in the rod bundles is close to the Dittus-Boelter correlation. Two phase heat transfer coefficient is smaller than expected, but the measurements were disturbed by surface fouling. Single phase friction or turbulent flow is the same as obtained earlier in similar conditions. Two phase friction was measured up to large steam qualities beyond dryout in small mass fluxes. Local minimum of friction occurs around the crisis point. The Baroczy curves predict two phase friction best of the correlations.
Author (ESA)

N83-30980# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.
A COMMAND PROCEDURE FOR PRESENTING THE PARAMETERS OF THE SHOCK WAVE FROM DETONATING EXPLOSIVE CHARGES: TRYCK
Bertil Tollbom 28 Mar. 1983 18 p refs In SWEDISH; ENGLISH summary
(FOA-C-20487-D4; ISSN-0347-3694) Avail: NTIS HC A02/MF A01

A computer operating system for an interactive determination of the independant variables of shock waves in the air is described. For a given distance and charge weight, one or several shock wave variables can be obtained. For a given charge weight the variables can be found for different distances. Variables can be determined by chart plotting. Data is available for trinitotoluene, and fuel-air explosive charges. Author (ESA)

N83-30981# Stadtwerke Mannheim A.G. (West Germany). Technisches Zentralbuero fuer Grundsatzplanung.
DESIGN, CONSTRUCTION AND TEST OF A HEAT-INSULATED PIT-TYPE HEAT STORE CONTAINING 30,000 CUM HOT WATER AT TEMPERATURES > 90 C Final Report, Apr. 1981
Walter Geipel Bonn Bundesministerium fuer Forschung und Technologie Mar. 1983 220 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-020; ISSN-0340-7608) Avail: NTIS HC A10/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37,50

The construction of a very large pressureless hot water displacement storage tank in the ground in or near heavily populated areas, taking into account safety and environmental factors, and whether an economic operation using the system as a seasonal store over a whole year can be expected for water

storage temperatures of at least 90C was studied. Several design concepts for earth and container stores were compared. A cylindrical steel storage basin represents the best solution from a technical and economical point of view, but no decision to proceed was taken. Author (ESA)

N83-30733# Grumman Aerospace Corp., Bethpage, N.Y.
REDUCTION OF HYDRAULIC LINE OSCILLATING PRESSURES INDUCED BY PUMP CAVITATION
George Druhak, Paul Marino, and Murray Bernstein *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 103-121 refs (For primary document see N83-30722 19-31)
(Contract N00019-77-A-0202)
Avail: NTIS HC A08/MF A01 CSCL 20/4

N83-30739# Vermont Univ., Burlington. Dept. of Mechanical Engineering.
RESPONSE OF PNEUMATIC ISOLATOR TO STANDARD PULSE SHAPES
M. S. Hundal *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 161-168 refs (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/4

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources.* For related information see also *06 Aircraft Instrumentation,* and *19 Spacecraft Instrumentation.*

N83-30982# British Library Lending Div., Boston Spa (England).
TUNABLE MODELS IN MEASURING SYSTEMS
V. P. Avdeev, Ya. G. Parparov, L. A. Sulman, L. P. Myshlyaev, and A. V. Polyak 1982 13 p refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved. Chern. Met. (USSR), no. 6, 1982 p 142-147
(BLL-M-34995-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The inclusion of tunable models in technological measuring systems, including those used in the iron and steel industry is considered. A method is proposed for the stable estimation of process parameters that consists of the anti-interference tuning of partial models of signal sources by means of robust isolation and smoothing of the informative regions of data with explicit allowance for the criteria of variability of residues and the estimates themselves. S.L.

N83-30983 Sira Inst. Ltd., Chislehurst (England).
A GUIDE TO THE TASKS IN DEVELOPING MICROPROCESSOR-BASED INSTRUMENTS AND THE RESOURCES REQUIRED
F. W. D. Woodhams (East Anglia Univ., Norwich, England) May 1982 37 p Sponsored by UK Dept. of Industry's Computers, Systems and Electronics Requirements Board
(SIRA Proj. 6/5068/11) Copyright. Avail: Issuing Activity

Product conception and specification, preliminary design, feasibility study, development planning, system design, hardware design, software design and integration and testing are discussed. Author (ESA)

N83-30984 Sira Inst. Ltd., Chislehurst (England).
A COMPARATIVE STUDY OF THE INTEL 8086, ZILOG Z8000 AND MOTOROLA MC68000
E. N. Goodyer and P. Neylan Mar. 1982 47 p refs Sponsored by UK Dept. of Industry's Computers, Systems and Electronics Requirements Board
(SIRA Proj. 6/5068/23) Copyright. Avail: Issuing Activity

The facilities provided by each 16 bit microprocessor are summarized and compared including addressing modes, arithmetic and logic operations, instruction pointer control, input-output and bit manipulation, complex arithmetic operations, data logging, analog interface and interrupt handling. Author (ESA)

N83-30985 Sira Inst. Ltd., Chislehurst (England).
AN INTRODUCTION OF THE IEC 625 (IEEE 488) STANDARD INTERFACE
J. C. Taunton Aug. 1981 32 p refs Sponsored in part by UK Dept. of Industry's Computers, Systems and Electronics Requirements Board
(SIRA Proj. 6/5068/31) Copyright. Avail: Issuing Activity

The IEC 625 interface system for programmable measuring instruments is introduced. The interface is a high speed asynchronous bit-parallel byte-serial communications link with handshaking and interface management and control. Instruments can be connected to the interface bus in a linear (daisychain) or star configuration or a mixture of the two, and can operate in a single master multislave arrangement. The interface is optimized for high speed communications between instruments in close proximity in electrically quiet surroundings. The maximum number of instruments that can be interconnected in a single system is 15. The total bus length must not exceed 20 m or the number of instruments x 2 m, whichever is shorter. The maximum communication rate is 1 Mbyte/sec. Dedicated LSI devices which implement the full interface or a subset of it are discussed. The implications of incorporating the interface in instrumentation are examined in terms of the product cost and complexity. Author (ESA)

N83-30986 Sira Inst. Ltd., Chislehurst (England).
THE USE OF MICROPROGRAMMABLE PROCESSORS IN INDUSTRIAL INSTRUMENTATION
D. Ibrahim (City Univ.), W. H. Simmonds, and A. C. Davies (City Univ.) May 1981 55 p refs Sponsored by UK Dept. of Industry's Computers, Systems and Electronics Requirements Board
(SIRA-Proj-6/5068/34) Copyright. Avail: Issuing Activity

The basic principles of microprogrammable bit-slice processors, and the advantages and disadvantages of these processors, relative to fixed instruction set processors are discussed. Applications of bit-slice processors are illustrated for computers with modifiable features, controllers for specific tasks, fast signal processing, and programmable controllers. The implications of using bit-slice processors are discussed in terms of the skills and tools required. Author (ESA)

N83-30987 Sira Inst. Ltd., Chislehurst (England).
A GUIDE TO RELIABILITY ASPECTS OF MICROPROCESSOR-BASED INSTRUMENT DEVELOPMENT
J. C. Taunton Mar. 1982 54 p refs Sponsored by UK Dept. of Industry's Computers, Systems and Electronics Requirements Board
(SIRA Proj-6/5068/51) Copyright. Avail: Issuing Activity

Techniques for assessing the hardware reliability of microprocessor-based products are reviewed. Models for predicting the failure rates of indifferent categories of microelectronic components, failure mechanisms, and degradation processes are examined. The failure rates of several types of microprocessor, memory and peripheral component, obtained from accelerated life testing are given. Software design philosophies, the choice of programming languages and methods of software testing and reliability assessment are discussed. The life characteristics of microelectronic components follow the same curve as those for discrete digital or analog components, and similar models can be used to describe their failure characteristics. Best estimates of system reliability come from the independent assessment of hardware and software reliability. The overall reliability of hardware is expected to be better in LSI systems, although initial failure rates can be higher than for discrete components. Author (ESA)

N83-30988 Sira Inst. Ltd., Chislehurst (England).
PRODUCTION TESTING MICROPROCESSOR-BASED INSTRUMENTATION

P. D. Britten and R. A. Brook May 1981 38 p refs Sponsored by UK Dept. of Industry's Computers, Systems and Electronics Requirements Board
(SIRA Proj. 6/5068/52) Copyright. Avail: Issuing Activity

The differences between production testing of microprocessor-based process instruments and production testing of conventional instruments using analog or random logic circuits, by manufacturers producing < 1000 units per year are examined. Design guidelines which facilitate production testing are summarized. Testing of: components and bare circuit boards before assembly; completed boards; and the fully assembled system are outlined. Choice and availability of test equipment are discussed. Author (ESA)

N83-30989 Royal Aircraft Establishment, Farnborough (England).
A REMOTE CONTROL FACILITY FOR A UMATIC VIDEO CASSETTE RECORDER
J. A. C. Beattie and P. Bromwich Oct. 1982 22 p
(RAE-TM-SPACE-313; BR86733) Copyright. Avail: Issuing Facility

A remote control unit with a search and repeat facility for a Umatic video recorder, allowing a specified portion of tape to be automatically searched for and played, without any extra control recordings is presented. Frequency divider and counter and phase oscillator are on one board; display driver switch debounce and power regulators on another; comparators and LED drivers on a third; and control logic on a fourth. Author (ESA)

N83-30990# Canada Inst. for Scientific and Technical Information, Ottawa (Ontario).
A DEVICE FOR DATA PREPROCESSING IN AN ENGINEERING VISION SYSTEM
V. E. Dvorovkin and V. A. Pankov 1983 6 p refs Transl. into ENGLISH from Prib. i Sistemy Upr. (USSR), no. 9, 1982 p 39-40
(NRC/CNR-TT-2065; ISSN-0077-5606) Avail: NTIS HC A02/MF A01

A device for the preprocessing of visual information from a photomatrix which has a dimensionality of 16 x 16 and is being used in a binary regime. The preprocessing consists of the extraction of data for computing the coordinates of the geometric center of silhouettes with two axes of symmetry. The device determines the numbers of the I and J lines and columns of the sensitive surface of the photomatrix, onto which the image is projected, with the first (I sub f, J sub f) and last (I sub p, J sub p) of these transferred for the definitive calculations into a control processor where the final operation of the calculations is performed, i.e., the determination of their arithmetic mean, which is taken as an estimate of the geometric center coordinates. The functional diagram of the data preprocessing device is presented. S.L.

N83-30991# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
STUDY OF QUALITY MEASURES FOR PROPORTION ESTIMATING WITHIN A PIXEL M.S. Thesis [ESTUDO DE MEDIDAD DE QUALIDADE PARA ESTIMACAO DE PROPORCOES DE CLASSES EM ELEMENTOS DE RESOLUCAO DE IMAGENS]
Virginia Ragoni de Moraes Correia Apr. 1983 110 p refs In PORTUGUESE; ENGLISH summary
(INPE-2712-TDL/131) Avail: NTIS HC A06/MF A01

Techniques were developed to estimate the proportion of classes within an image resolution element (pixel). The quality of the estimation depends strongly upon the geometry that is defined by the statistical mean vectors of the different classes. As a contribution, the present work introduces measures related to the quality of that geometry. Such measures are based on the notion of angles defined by the geometry and, mainly, on the condition number of the problem. With the scope of testing the proposed measures, a technique is used to estimate proportions, based on the minimization of a quadratic function subject to constraints. Author

N83-30992*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
HANDBOOK ON COMTAL'S IMAGE PROCESSING SYSTEM
Nettie D. Faulcon Jul. 1983 54 p
(NASA-TM-85671; NAS 1.15:85671) Avail: NTIS HC A04/MF A01 CSCL 14E

An image processing system is the combination of an image processor with other control and display devices plus the necessary software needed to produce an interactive capability to analyze and enhance image data. Such an image processing system installed at NASA Langley Research Center, Instrument Research Division, Acoustics and Vibration Instrumentation Section (AVIS) is described. Although much of the information contained herein can be found in the other references, it is hoped that this single handbook will give the user better access, in concise form, to pertinent information and usage of the image processing system. Author

N83-30993*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
THE DEVELOPMENT OF A POWER SPECTRAL DENSITY PROCESSOR FOR C AND L BAND AIRBORNE RADAR SCATTEROMETER SENSOR SYSTEMS
Dan A. Harrison, III and John T. Chladek Feb. 1983 115 p refs (Contract NAS9-15800)
(NASA-CR-171668; NAS 1.26:171668; LEMSCO-19158) Avail: NTIS HC A06/MF A01 CSCL 14B

A real-time signal processor was developed for the NASA/JSC L-and C-band airborne radar scatterometer sensor systems. The purpose of the effort was to reduce ground data processing costs. Conversion of two quadrature channels of data (like and cross polarized) was made to obtain Power Spectral Density (PSD) values. A chirp-z transform (CZT) approach was used to filter the Doppler return signal and improved high frequency and angular resolution was realized. The processors have been tested with record signals and excellent results were obtained. CZT filtering can be readily applied to scatterometers operating at other wavelengths by altering the sample frequency. The design of the hardware and software and the results of the performance tests are described in detail. Author

N83-30994*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
INSTRUMENTAL EFFECTS ON THE TEMPERATURE AND DENSITY DERIVED FROM THE LIGHT ION MASS SPECTROMETER
Paul D. Craven and David L. Reasoner Jun. 1983 28 p refs
(NASA-TM-82536; NAS 1.15:82536) Avail: NTIS HC A03/MF A01 CSCL 14B

An expression for the flux into a retarding potential analyzer (RPA) is derived which takes into account the instrumental effect of a dependence on energy of the solid angle of the acceptance cone. A second instrumental effect of a limited bandpass is briefly discussed. Using the (LIMS) instrument on SCATHA, it is shown that temperatures and densities derived without considering the effect of the solid angle dependence on energy will be too low, dramatically so for E(t) > E(1), where E(1) is the e folding distance of the solid angle dependence and E(t) is the thermal energy of the plasma. For E(t) < < E(1), there is effectively no impact on the derived temperatures and densities if the solid angle effect is ignored. M.G.

N83-30995# Draper (Charles Stark) Lab., Inc., Boston, Mass.
MATERIALS RESEARCH FOR ADVANCED INERTIAL INSTRUMENTATION. TASK 3: RARE EARTH MAGNETIC MATERIAL TECHNOLOGY AS RELATED TO GYRO TORQUERS AND MOTORS Technical Report, 1 Oct. 1981 - 30 Sep. 1982
D. Das and K. Kumar Dec. 1982 73 p refs
(Contract N00014-77-C-0388)
(AD-A126982; CSDL-R-1614; TR-5) Avail: NTIS HC A04/MF A01 CSCL 20/3

Flux stability experiments on SmCo5 have demonstrated that no clear correlation or dependence exists between the stability of flux in a magnet and its intrinsic properties Hk and Hci, a belief that has gained wide acceptance on the basis of earlier reported findings. This study shows that the level of the measured flux

decay rate is, in contrast, intimately related to the amount of the Sm2Co7 phase present in the material (the higher the level), the greater is the decay rate) as well as to the cooling procedure. Fast cooling suppresses precipitation of excess oxygen that is present is solid solution at elevated temperatures and this results in a high decay rate at lower operating temperatures. The present results are considered extremely significant in that these provide, it is believed, for the first time the recipe to produce SmCo5 magnets which are very stable with time. The preferred fabrication procedure should include producing of magnets with a composition of near-stoichiometric SmCo5 with a low level of oxygen and possibly a low level of internal stress. GRA

N83-30996# Army Test and Evaluation Command, Aberdeen Proving Ground, Md.
STRAIN MEASUREMENT - UNIDIRECTIONAL Final Report
20 Apr. 1983 28 p
(AD-A127325; TPO-3-1-006) Avail: NTIS HC A03/MF A01 CSCL 14/2

Document describes procedures for measuring dynamic strains that occur during weapon firing and vehicle tests, when the principal direction of the strain is known. It includes the use of foil and wire resistance strain gages. GRA

N83-30997# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A PORTABLE PHYSIOLOGICAL DATA RECORDER USING MAGNETIC BUBBLE MEMORY M.S. Thesis
Grover Raymond Sims Mar. 1983 102 p refs
(AD-A127304; AFIT/GE/EE/83M-2) Avail: NTIS HC A06/MF A01 CSCL 01/4

The test documents the physical design of a man-portable digital data acquisition system. Work includes schematics and detail part drawings. The design is essentially a single board computer featuring all CMOS parts. Secondary storage is on a mixed technology board which includes an INTEL 7110 magnetic bubble memory device. GRA

N83-30998# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. Dept. of Engineering Physics.
DESIGN STUDY OF A TOROIDAL ELECTROSTATIC ANALYZER M.S. Thesis
Robert LaVerne Hartley, Jr. Dec. 1982 105 p refs
(AD-A127432; AFIT/GEP/PH/82D-11) Avail: NTIS HC A06/MF A01 CSCL 14/2

The design of a toroidal, electrostatic analyzer is discussed with special emphasis on the instrument providing channels of data by sampling different points of the energy spectra simultaneously. Two additional results of this study are that a toroidal analyzer can have four times the resolution of a spherical analyzer and can cover sixteen times as much of the energy spectra (with a fixed electrode voltage). The electrostatics, equations of motion, and the optic equations are discussed. The applications chapter discusses the use of multiple, off-center slits, the minization of the size of the instrument, the trade-offs that must be made in designing an instrument, the effect of field errors, the minimization of the effects of the field errors, and the total beam current as seen by the detector. Included in the appendix are design curves that should be of assistance to the reader in designing his own instrument. Author (GRA)

N83-30999# Varian Associates, Palo Alto, Calif. Microwave Tube Div.
THE 60-GHz GYROTRON DEVELOPMENT PROGRAM Quarterly Report, Jul. - Sep. 1982
J. F. Shively, M. Caplan, E. K. Choi, L. J. Craig, S. J. Evans, K. L. Felch, L. J. Fox, G. Hu, R. H. Jory, and J. K. Mann 1982 114 p refs
(Contract W-7405-eng-26)
(DE83-008554; ORNL/Sub-79/21453/13; QR-13) Avail: NTIS HC A06/MF A01

A microwave oscillator capable of producing 200 kW of CW power at 60 GHz was developed. A CW experimental tube, X-5, which incorporated a thinner double disc output window to improve window bandwidth, and some modifications to the drift tunnel and cavity coupling proven to be successful in earlier pulse tube tests produced 123 kW of CW output power at 60 GHz before RF load coolant boiling and tube window failure terminated tests. A water load of new design was constructed and used in conjunction with a 56 GHz gyrotron next quarter. Alternative window designs are being explored and developed. DOE

N83-31000# California Univ., Livermore. Lawrence Livermore Lab.
FLAT-RESPONSE X-RAY-DIODE-DETECTOR DEVELOPMENT
G. Tirsell Oct. 1982 28 p refs Presented at 24th Am. Phys. Soc. Ann. Meeting, New Orleans, 1 Nov. 1982
(Contract W-7405-eng-48)
(DE83-001651; UCRL-87946; CONF-821128-1) Avail: NTIS HC A03/MF A01

Design of an improved sub-nanosecond flat response X-ray diode (XRD) detector was discussed. This device consists of a high Z cathode and a complex filter tailored to flatten the response so that the total X-ray energy below 1.5 keV is measured using a single detector. Three major problems have become evident as a result of our work with the original design including deviation from flatness due to a peak in the response below 200 eV, saturation at relatively low X-ray fluences, and long term gold cathode instability. Grazing incidence reflection to reduce the response below 200 eV, new high Z cathode materials for long term stability, and a new complex filter for improved flatness were investigated. Better saturation performance requires a modified XRD detector under development with reduced anode to cathode spacing and increased anode bias voltage. DOE

N83-31001# Brookhaven National Lab., Upton, N. Y.
OPTIMIZED STAGE DESIGN FOR X-RAY-FLUORESCENCE ANALYSIS IN THE SEM
J. B. Warren and H. W. Kraner Oct. 1982 7 p Presented at the Scanning Electron Microscopy Ann. Meeting, Anaheim, Calif., Apr. 1982
(Contract DE-AC02-76CH-00016)
(DE83-003174; BNL-32095; CONF-820409-5) Avail: NTIS HC A02/MF A01

If one of the final apertures is replaced with a thin foil target, a scanning electron microscope (SEM) is used as a transmission X-ray tube for energy dispersive X-ray analysis. Potentially, energy dispersive X-ray spectra (EDS) from such a system will have a much improved signal to noise ratio when compared to electron probe excited spectra. In the typical SEM, the utility of this method is limited because the X-ray beam exiting from the target foil is poorly collimated and is extensively scattered by the massive specimen stage. This problem was eliminated in the AMR 1000A by mounting a collimator in the final pole piece to reduce the X-ray beam diameter and redesigning the specimen stage so that only lowmass, low Z materials are struck by the X-ray beam. The effect of X-ray excitation efficiency, target foil thickness, sample mounting materials, and stage alignment on system sensitivity is described. DOE

N83-31002# National Bureau of Standards, Washington, D.C.
PREDICTION OF THE LONG TERM STABILITY OF POLYESTER-BASED RECORDING MEDIA Annual Report
Daniel W. Brown, Robert E. Lowry, and Leslie E. Smith Jun. 1982 47 p refs Sponsored in part by the National Archives and Records Service
(PB83-172668; NBSIR-82-2530; AR-1) Avail: NTIS HC A03/MF A01 CSCL 14C

The stability of poly(ethylene terephthalate) which was studied to predict its long term behavior as the base of the film and tape used to record archival information is reported. Film base, with and without photographic and other coatings, was aged at several temperatures and humidities. Mechanical and calorimetric properties and molecular weights were measured at intervals. Magnetic tapes based on poly(ethylene terephthatate) usually have a polyester polyurethane binder that holds the magnetic particles. It

is found that the binder more sensitive to hydrolysis than the tape base. It is shown that in thermoplastic polyester polyurethane there may be an equilibrium extent of degradation for any storage condition. GRA

N83-31003# Technische Hogeschool, Delft (Netherlands).
INFLUENCE OF THE LAYER THICKNESSES OF A DOUBLE-LAYER MEDIUM ON THE REPRODUCED SIGNAL IN PERPENDICULAR RECORDING
D. Quak Mar. 1982 13 p refs
(PB83-166744; Rept-1982-03) Avail: NTIS HC A02/MF A01 CSCL 14C

The influence of the thickness of the layers in a single or double layer medium and of the permeability of the backlayer on the reproduced signal in perpendicular recording was investigated. With the aid of the reciprocity theorem of magnetic recording the harmonic response is calculated. The influence of its thickness proves to be small for a highly permeable isotropic backlayer. GRA

N83-31004# California Univ., Berkeley.
QUANTITATIVE X-RAY POWER DIFFRACTION ANALYSIS OF AIR PARTICULATE SAMPLES
Albert C. Thompson, L. R. Johnson, and J. M. Jaklevis 1983 13 p refs
(PB83-178202; EPA-600/D-83-023) Avail: NTIS HC A02/MF A01 CSCL 14B

The design, operation and calibration of an X-ray powder diffraction system for the analysis of air particulate samples were described. The instrument analyzes a sample non-destructively for its major crystalline components. The system was optimized for the non-destructive analysis of major crystalline species deposited on samples collected with dichotomous air samplers. It includes a position-sensitive detector for increased sensitivity and a small computer for rapid on-line data analysis. A calibration procedure was developed to give direct quantitative measurements of the primary chemical compounds on the sample. This system was used to analyze 18 pairs of samples of the Houston aerosol. The results of this analysis when combined with the measurement of the elemental concentrations by XRF analysis give additional discrimination in source receptor models. GRA

N83-31005# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
STUDY OF FACTORS INFLUENCING THE CALIBRATION OF OPTICAL Cn2 METERS
G. R. Ochs and R. J. Hill Oct. 1982 30 p refs
(PB83-171082; NOAA-83022301) Avail: NTIS HC A02/MF A01 CSCL 14B

Factors affecting the calibration of optical Cn2 meters of the modulated light emilling diode (LED) design were identified. Design modifications to the 5 cm units were made as a result. The results indicate that a system working over 500 to 1000-meter paths, employing a 15-cm diameter transmitter and a single 15-cm diameter reciever, had advantages over the dual 5 cm systems in certain applications. GRA

N83-31006# National Bureau of Standards, Washington, D.C. National Engineering Lab.
WAVE FORM SIMULATIONS FOR JOSEPHSON JUNCTION CIRCUITS USED FOR NOISE THERMOMETRY
F. Sullivan, D. Kahaner, H. A. Fowler, and J. Knapp-Cordes Jan. 1983 58 p refs
(PB83-165472; NBSIR-83-2643) Avail: NTIS HC A04/MF A01 CSCL 14B

Numerical approximations to the solutions of the non-linear equation which is a model for simulating the behavior of the circuit consisting of a series connection of an inductor, a resistor and a Josephson junction (used as a noise thermometer) were discussed. GRA

N83-31007# National Bureau of Standards, Washington, D.C.
SEMICONDUCTOR MEASUREMENT TECHNOLOGY: INTERLABORATORY STUDY ON LINEWIDTH MEASUREMENTS FOR ANTIREFLECTIVE CHROMIUM PHOTOMASKS
John M. Jerke, M. Carroll Croarkin, and Ruth N. Varner Oct. 1982 194 p refs
(ARPA Order 2397)
(PB83-164392; NBS/SP-400-74) Avail: NTIS HC A09/MF A01 CSCL 14B

The results of an interlaboratory study to evaluate a National Bureau of Standards (NBS) prototype calibration standard for linewidth measurements on IC photomasks and procedures for adjusting and calibrating optical-microscope systems in the 0.5 to 12 micrometer measurement range. Using procedures furnished by NBS, industrial particpants measured line spacings and linewidths on NBS antireflective-chromium artifacts. GRA

N83-30469# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
MULTISPECTRAL ELECTRO-OPTICAL STEREO SCANNER (MEOSS); AN EXPERIMENTAL CCD CAMERA FOR REMOTE SENSING
A. Drescher *In its* DFVLR/ISRO Colloq. about a Decade of Cooperation in the Field of Space Res. and Technol. Jan. 1983 p 35-66 refs (For primary document see N83-30466 19-12)
Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 35,20

N83-30473# Indian Space Research Organization, Ahmedabad. Space Applications Centre.
MICROWAVE REMOTE SENSING PROGRAM OF THE INDIAN SPACE RESEARCH ORGANIZATION (ISRO) AND DFVLR
D. S. Kamat *In* DFVLR DFVLR/ISRO Colloq. About a Decade of Cooperation in the Field of Space Res. and Technol. Jan. 1983 p 103-111 (For primary document see N83-30466 19-12)
Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 35,20

N83-30710# Southwest Research Inst., San Antonio, Tex.
DIGITAL CONTROL OF A SHAKER TO A SPECIFIED SHOCK SPECTRUM
James F. Unruh *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 3 May 1982 p 1-9 refs (For primary document see N83-30709 19-31)
Avail: NTIS HC A12/MF A01 CSCL 14/2

N83-30711# Dynamic Systems, Inc., McLean, Va.
MEASUREMENT OF ALL COMPONENTS OF STRAIN BY A 3-D FIBER OPTIC STRAIN GAGE
S. Edelman and C. M. Davis, Jr. *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 3 May 1982 p 19-24 refs (For primary document see N83-30709 19-31)
Avail: NTIS HC A12/MF A01 CSCL 14/2

N83-30712# Army Engineer Waterways Experiment Station, Vicksburg, Miss.
REGISTRATION OF THREE SOIL STRESS GAGES AT 0 THROUGH 28 MPa (4000 psi)
Charles R. Welch *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 3 May 1982 p 25-30 refs Sponsored in part by Defense Nuclear Agency (For primary document see N83-30709 19-31)
Avail: NTIS HC A12/MF A01 CSCL 14/2

N83-30753# Washington Univ., St. Louis, Mo.
MEASUREMENT IN PERSPECTIVE
Robert M. Mains *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Pt. 1 Sep. 1980 p 15-16 refs (For primary document see N83-30752 19-31)
Avail: NTIS HC A04/MF A01 CSCL 14/2

N83-30758# Systron Donner Corp., Concord, Calif.
A PRECISION INERTIAL ANGULAR VIBRATION MEASURING SYSTEM
H. D. Morris, R. B. Peters, and P. H. Merritt (AFWL) *In* Shock and Vibration Information Center The Shock and Vibration Bull., no. 50, part 2 Sep. 1980 p 1-10 refs 4 Vol. (For primary

document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 14/2

N83-30762# California Univ., Livermore. Lawrence Livermore Lab.
AUTOMATIC DATA CHANNEL CALIBRATION AND NOISE IDENTIFICATION
Edwin E. Nesbit *In* Shock and Vibration Information Center The Shock and Vibration Bull., no. 50, part 2 Sep. 1980 p 57-72 refs 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 14/2

N83-31212 United Kingdom Atomic Energy Authority, Abingdon (England).
NANOSECOND RESOLUTION OF DOT-E, DOT-H, AND DOT-I IN AIRCRAFT LIGHTNING TEST RIGS
B. J. C. Burrows *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 9 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31307# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Inst. for Aerospace Medicine.
PROBLEMS OF 0G SIMULATION WITH THE FAST RUNNING CLINOSTAT
A. Schatz *In* ESA Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 103-105 refs (For primary document see N83-31285 19-51)
Avail: NTIS HC A07/MF A01

36 LASERS AND MASERS

Includes parametric amplifiers.

N83-31008 Prins Maurits Lab. TNO, Rijswijk (Netherlands).
LASER-INDUCED INITIATION OF EXPLOSIONS
M. W. Leeuw Aug. 1982 34 p refs In DUTCH; ENGLISH summary
(PML-1982-39; TDCK-77125) Copyright. Avail: Issuing Activity

The experimental setup used to study laser-induced initiation of explosives is presented and experimental results are discussed. Internal molecular energy distribution in laser-induced initiation and the role of excited electronic states in initiation processes are treated. The spectroscopic characteristics of the cyclic polynitramines HMX and RDX, and the conditions that have to be fulfilled to enable the study of laser-induced initiation in an explosive are considered. Author (ESA)

N83-31009*# National Aeronautics and Space Administration, Washington, D. C.
A TUNABLE DUAL FREQUENCY DYE LASER - DUAL FREQUENCY OSCILLATOR DESIGN
Y. Abury May 1983 46 p Transl. into ENGLISH of "Laser a Colorant Bifrequence Accordable" rept. ONERA-DERO-1/6083-3 ONERA, Toulouse, 11 Dec. 1981 43 p Original language document was announced as N83-32725 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-77080; NAS 1.15:77080) Avail: NTIS HC A03/MF A01 CSCL 20E

The pulsed dye laser offers a tunable oscillator, followed by three amplifiers. It is pumped by a dual frequency Nd:YAG laser. Tuning and spectral width are controlled by a holographic network connected to a high power telescope. The modified two wavelength dye laser allows for absorption lidar techniques for remote sensing of the atmosphere. Line switching is achieved by electrooptical commutation. A feasibility experiment was performed with the original oscillator. A model was then built, and tested with different dyes. After a few modifications were made to improve the conversion efficiency, this oscillator was inserted in the laser to check whether the amplifier stages were correctly adjusted. S.L.

N83-31010# Battelle Columbus Labs., Ohio.
LASER PRODUCED X-RAYS FOR HIGH RESOLUTION LITHOGRAPHY Interim Report, 15 Dec. 1981 - 1 Jan. 1983
Harold Epstein 13 Jan. 1983 39 p refs
(Grants AF-AFOSR-0066-82; AF-AFOSR-3575-78; AF Proj. 2301)
(AD-A126889; AFOSR-83-0176TR) Avail: NTIS HC A03/MF A01 CSCL 14/5

The laser-plasma interaction is characterized to gain an understanding of the spectrum of X-rays emitted by the plasma. The potential use of the radiated X-ray for lithography is explored. GRA

N83-31011# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
LASER JOURNAL: SELECTED ARTICLES
16 Feb. 1983 9 p Transl. into ENGLISH from Jiguang (China), v. 9, no. 5, 1982 p 96, 106-107
(AD-A126883; FTD-ID(RS)T-1751-82) Avail: NTIS HC A02/MF A01 CSCL 20/5

Several types of lasers and their applications are discussed. The precise determination of temporal difference of atomic clocks in two separate places with a laser pulse transfer technique is discussed. Laser glittering in the relatively stable propagation layer near the ocean surface is discussed. R.J.F.

N83-31012# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. Dept. of Electro-Optics.
CHARACTERIZATION OF LASER BEAM QUALITY M.S. Thesis
Arsenio T. Gumahad, II Dec. 1982 107 p refs
(AD-A127412; AFIT/GEO/PH/82D-4) Avail: NTIS HC A06/MF A01 CSCL 20/5

Current methods of characterizing the quality of laser beams were found to be generally insufficient. Since lasers are gaining more use in many applications, an improved set of quality criteria must now be developed. This thesis report investigated characteristics of random phase aberrations and its effects on the far-field irradiance distribution of lasers. A numerical model was developed to simulate nondiffraction-limited beams. Author (GRA)

N83-31013# Los Alamos Scientific Lab., N. Mex.
HIGH-EFFICIENCY FREE-ELECTRON LASER RESULTS
K. Boyer, C. A. Brau, B. E. Newman, W. E. Stein, R. W. Warren, J. G. Winston, and L. M. Young 1982 10 p refs Presented at the Intern. Conf. on Free-Electron Lasers, Bendor, France, 27 Sep. - 1 Oct. 1982
(Contract W-7405-eng-36)
(DE83-007545; LA-UR-83-330; CONF-820988-7) Avail: NTIS HC A02/MF A01

Results obtained with a tapered-wiggler free-electron laser show deceleration of electrons by as much as 7%, and extraction of more than 3% of the total electron-beam energy as laser energy. DOE

N83-31014# Princeton Univ., N. J. Plasma Physics Lab.
HIGH-ENERGY D2O SUBMILLIMETER LASER FOR PLASMA DIAGNOSTICS
A. Semet, L. C. Johnson, and D. K. Mansfield Jan. 1983 24 p refs
(Contract DE-AC02-76CH-03073)
(DE83-007246; PPPL-1971) Avail: NTIS HC A02/MF A01

A narrow line optically pumped D2O laser operating at 385 microns has delivered more than 5J in pulses longer than 3 microseconds using a large aperture unstable resonator cavity design. Pulse levels greater than 1J, 1 microsecond are necessary for a single shot ion temperature measurement by Thomson scattering in large Tokamaks. Experiments have, for the most part, been conducted at a 360J, 5 microsecond CO2 laser pump level where high efficiency (approximately 2.5 J at 385 microns) has been obtained. These are the highest energies reported to

date in the far infrared. In addition, the pulse length has been extended beyond the vibrational relaxation time. IAA

N83-31015# Arkansas Univ., Fayetteville. Water Resources Research Center.
APPLICATION OF A LASER INTRACAVITY ABSORPTION DETECTOR TO GAS CHROMATOGRAPHY OF TRACE ORGANIC POLLUTANTS IN WATER
Robert B. Green Dec. 1982 32 p refs
(Contract DI-14-34-0001-1205)
(PB83-173195; Pub-89; W83-02128; OWRT-B-066-ARK(1)) Avail: NTIS HC A03/MF A01 CSCL 14B

A helium-neon (HeNe) laser operating simultaneously at 3.39 micrometers (infrared) and 0.63 micrometer (visible) were used as a selective detector for hydrocarbons in the effluent of a gas chromatography. The infrared and visible laser transitions originate at the same energy level and are competitive. In practice, the detector's selectivity for hydrocarbons is modified by various substituents. The detector responds to aliphatic and aromatic hydrocarbons with aliphatic side chains, except for those substituted with halogens. The HeNe laser intracavity absorption detector may be used without prior separation in some cases (e.g., methane in coal mines). This detector operates with nitrogen carrier gas without sacrifice of sensitivity and should be useful for monitoring organic pollutants since it does not respond to water or carbon dioxide. Also, it should be possible to manufacture this detector at competitive prices. GRA

N83-30791# Air Force Weapons Lab., Kirtland AFB, N. Mex.
EVALUATION OF AIRBORNE LASER BEAM JITTER USING STRUCTURAL DYNAMICS COMPUTER CODES AND CONTROL SYSTEM SIMULATIONS
C. L. Budde, P. H. Merritt, and C. D. Johnson (Anamet Lab., Inc., San Carlos, Calif.) *In* Shock and Vibration Bulletin, no. 50, part 3 Sep. 1980 p 179-188 refs (For primary document see N83-30778 19-31)
Avail: NTIS HC A10/MF A01 CSCL 20/5

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N83-31016# Central Electricity Generating Board, London (England).
THE DYNAMICS OF PISTON RING WEAR IN A SULZER 5BAH-22 ENGINE OPERATING ON HIGH-VISCOSITY FUEL
R. Smolak 1983 17 p refs Transl. into ENGLISH from Tech. Smarownicza - Trybologia (Poland), v. 10, no. 2, 1979 p 49-55
(BLL-CE-Trans-7872-(9022.09)) Avail: British Library Lending Div., Boston Spa, Engl.

In order to reduce fuel costs, work was carried out with the aim of burning cheaper fuels with a high viscosity in medium speed engines of the Sulzer BAH type. The results of comparative investigations of the wear of piston rings in this engine, using the radio-isotope method and employing a mixture of fuel oil and furnace oil is discussed. S.L.

N83-31017# Central Electricity Generating Board, London (England).
PREDICTION OF PENETRATION IN WELDED JOINTS FROM WELDING CONDITIONS. 1: FUNDAMENTAL TREATMENT OF PENETRATION
M. Watanabe and K. Satoh 1983 21 p refs Transl. into ENGLISH from Yosetsu Gakkaishi (Japan), v. 24, no. 12, Dec. 1955 p 512-519
(BLL-CE-Trans-7903-(9022.09)) Avail: British Library Lending Div., Boston Spa, Engl.

Experiments on penetration in bead welding were performed to provide fundamental data, and theoretical equations for penetration from the temperature distribution in a plate due to welding were derived. The experimental and theoretical results were then combined in a fundamental investigation of the relation between penetration and welding conditions (arc voltage, current, welding speed, electrode size etc.). S.L.

N83-31018# Central Electricity Generating Board, London (England).
TEMPERATURE INCREASE AND ELECTRIC CHARGE PRODUCED BY IMPACT OF A STEEL SPHERE ON A STEEL PLATE
H. Uetz and G. Gommel 1983 20 p refs Transl. into ENGLISH from Wear (West Germany), v. 9, 1966 p 282-296
(BLL-CE-Trans-7944-(9022.09)) Avail: British Library Lending Div., Boston Spa, Engl.

If individual impacts occur in close succession as during blasting, there is a considerable rise in the temperature of the specimen surface. With a hardened test plate with little surface wear, a blue heat tint was observed over the blasted surface after intensive blasting with soft shot with an impact velocity of about 70 m/sec. The complete specimen then had a measured maximum temperature of about 500 C, it is possible that at least the lower A sub 1 transportation point could be exceeded. Metallographic examinations of basted surfaces are at present being carried out, and the provisional results confirm these observations. Author

N83-31019*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
VARIABLE LENGTH STRUT WITH LONGITUDINAL COMPLIANCE AND LOCKING CAPABILITY Patent Application
Robert R. Belew, inventor (to NASA) Filed 1 Jul. 1983 15 p
(NASA-Case-MFS-25907-1; US-Patent-Appl-SN-510137) Avail: NTIS HC A02/MF A01 CSCL 13I

A variable length strut device is disclosed for connecting two associated structures which includes an outer load bearing shell, a drive assembly, a length varying compliance assembly positioned by a drive assembly, and a strut rod locking assembly. The load bearing shell includes a connecting part adapted for connection to a one associated structure. A strut connection rod has a connecting part adapted for connection to a another associated structure and a distal end with a piston driver slidably carried in a housing. Two pistons act in opposing directions on the piston driver to provide longitudinal compliance in a compliance mode of operation. The locking assembly includes locking balls which are urged in a locking ring where locking bolt is urged to the left by fluid pressure. Microswitches sense the displacement of pistons away from the internal ring to bring the pistons to a neutral position in which the pistons are in contact with the internal ring when it is desired to do so as effected by a control source. NASA

N83-31020*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AN EVALUATION OF GREASE-TYPE BALL BEARING LUBRICANTS OPERATION IN VARIOUS ENVIRONMENTS Status Report
E. L. McMurtrey Jun. 1983 24 p refs
(NASA-TM-82533; NAS 1.15:82533; SR-7) Avail: NTIS HC A02/MF A01 CSCL 11H

Because many future spacecraft or space stations will require mechanisms to operate for long periods of time in environments which are adverse to most bearing lubricants, a series of tests is continuing to evaluate 38 grease type lubricants in R-4 size bearings in five different environments for a 1 year period. Four repetitions of each test are made to provide statistical samples. These tests have also been used to select four lubricants for 5 year tests in selected environments with five repetitions of each test for statistical samples. At the present time, 142 test sets have been completed and 30 test sets are underway. The three 5 year tests in (1) continuous operation and (2) start stop operation, with both in vacuum at ambient temperatures, and (3) continuous vacuum operation at 93.3 C are now completed. To date, in both the 1 year and 5 year tests, the best results in all environments have been obtained with a high viscosity index perfluoroalkylpolyether (PFPE) grease. Author

N83-31021*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THE VARIABLE POLARITY PLASMA ARC WELDING PROCESS: ITS APPLICATION TO THE SPACE SHUTTLE EXTERNAL TANK Interim Report
A. C. Nunes, Jr., O. E. Bayless, Jr., C. S. Jones, III, A. P. Munafo, and W. A. Wilson Jun. 1983 51 p refs
(NASA-TM-82532; NAS 1.15:82532; IR-1) Avail: NTIS HC A04/MF A01 CSCL 13H

The technical history of the variable polarity plasma arc (VPPA) welding process being introduced as a partial replacement for the gas shielded tungsten arc process in assembly welding of the space shuttle external tank is described. Interim results of the weld strength qualification studies, and plans for further work on the implementation of the VPPA process are included. A.R.H.

N83-31022# Rocketdyne, Canoga Park, Calif.
RESTARTABLE HIGH POWER GAS GENERATOR Final Report, May 1979 - Aug. 1982
M. G. Gants Wright-Patterson AFB, Ohio AFWAL Dec. 1982 165 p refs
(Contract F33615-79-C-2004; AF Proj. 3145)
(AD-A127291; RI/RD82-224; AFWAL-TR-82-2119) Avail: NTIS HC A08/MF A01 CSCL 21/1

A requirement exists for a means of providing large amounts of power on an intermittent basis to special airborne systems. The objective of this effort was to demonstrate the feasibility of restartable, throttleable, LOX/JP-4 gas generator which requires no purge. Rocketdyne designed and fabricated a gas generator, capable of producing 15,000 HP when coupled with a 71% efficient turbine. Hot fire tests were performed, successfully demonstrating purgeless operation, fast start, restartability, hot gas temperature pattern factor, and required power levels. GRA

N83-31023# Sandia Labs., Albuquerque, N. Mex.
FULL-SCALE TURBINE-MISSILE CONCRETE IMPACT EXPERIMENTS Final Report
R. L. Woodfin Feb. 1983 159 p refs Sponsored by Electric Power Research Inst.
(Contract DE-AC04-76DP-00789)
(DE83-009251; EPRI-NP-2745) Avail: NTIS HC A08/MF A01

Four full-scale experiments were conducted at a rocket sled facility to provide data on the response of reinforced concrete containment walls to impact and penetration. Penetration depths into the 1.37-m-thick panels ranged from 33 cm for the blunt impact of the 1476-kg missile at 92 m/s to 65 cm for the piercing impact of the 2100-kg missile at 115 m/s. Impact at the piercing attitude caused significantly more severe rear face cracking than did impact at the blunt attitude, but since rear face panel displacements in excess of 6 cm and velocities greater than 7 m/s were measured, results suggested that impact at a blunt attitude might cause scabbing at lower velocities than impact at a piercing attitude. In these tests, the presence of a 9.5-mm-thick steel liner on the rear face of the panel in the latter two tests precluded scabbing. Results also indicated that design formulas in common use give conservative results. DOE

N83-31024# Biphase Energy Systems, Inc., Santa Monica, Calif.
DEVELOPMENT OF THE BIPHASE TURBINE FOR WASTE-HEAT CONSERVATION Final Report
Walter R. Studhalter Apr. 1982 270 p refs
(Contract DE-AC07-76ET-15350)
(DE83-012209; DOE/ET-15350/2) Avail: NTIS HC A12/MF A01

A Biphase turbine for generation of power from waste heat was designed and tested. The turbine generated a maximum of 168 Hp using a high pressure water/steam mixture as the working fluid. In an actual waste heat application, the hot water would be generated in an exhaust gas heat exchanger. The measured power at the design point, 138 Hp, was 90% of the design goal. Improvements were identified which should enable the turbine to reach the design efficiency, 45%. It is shown that the Biphase turbine was a significant market is waste heat recovery and in energy recovery from two-phase process streams. DOE

N83-31025# Aptech Engineering Services, Inc., Palo Alto, Calif.
INVESTIGATION AND RESEARCH OF SPECIFIC COMBUSTION-TURBINE AND COMBINED-CYCLE FIELD PROBLEMS Annual Report
Mar. 1983 134 p refs Sponsored by EPRI Prepared in cooperation with COECORP.
(EPRI Proj. 1802)
(DE83-901976; EPRI-AP-2888; AR-2) Avail: NTIS HC A07/MF A01

The problem of compressor-wheel failure is detailed. Pieces of a burst wheel are examined by metallographic and fractographic techniques. Results of one-dimensional, two-dimensional, and refined fracture mechanics analyses are presented. DOE

N83-31026# SRI International Corp., Menlo Park, Calif.
SCALE MODELING OF TURBINE-MISSILE IMPACT INTO CONCRETE Final Report
S. Mchugh, L. Seaman, and Y. Gupta Feb. 1983 150 p refs Sponsored by Electric Power Research Inst.
(DE83-901826; EPRI-NP-2746) Avail: NTIS HC A07/MF A01

Fourteen experiments were performed with one eleventh scale of turbine hub sectors impacting reinforced concrete wall sections of reactor containment buildings. The scale model tests provided the penetration depths and backface scabbing thresholds, and set a lower bound on the perforation thresholds. Comparison of the scale model results with predictions of NDRC design formulas show that these formulas adequately predicted the frontface penetration depths, but underpredicted missile impact velocities to produce backface scabbing by factors of 2 to 3. Finite difference computations of a missile impact predicted the fracture location in the target that led to cratering and showed the importance of missile interactions with the reinforcing grids. It is concluded that scale model tests can be used effectively to examine the response or reinforced concrete targets to various turbine missile impact conditions and that concrete walls are substantially more resistant to failure by turbine missile impact than predicted by current design formulas. DOE

N83-31027# Westinghouse Electric Corp., Concordville, Pa. Combustion Turbine Systems Div.
COMBUSTION-TURBINE DESIGN GUIDELINES BASED ON DEPOSITION-CORROSION CONSIDERATIONS. VOLUME 1: RESIDUAL-FUEL-OIL STUDIES Final Report
T. P. Sherlock, P. R. Mulik, G. A. Whitlow, S. Y. Lee, and R. A. Wenglarz Feb. 1983 123 p refs
(EPRI Proj. 1345-1)
(DE83-901454; EPRI-AP-2739-VOL-1) Avail: NTIS HC A06/MF A01

The potential problems associated with the use of residual oil as a combustion turbine fuel are discussed. Two such problems are hot corrosion of the turbine blades and vanes and the deposition of ash on the vanes, leading to reduced operating efficiency. To assess these potential problems, and thereby develop guidelines for operating with these fuels, tests were conducted in a pressurized passage using simulated turbine operating conditions. It is shown that the use of properly treated fuel should not cause accelerated corrosion and that the use of untreated fuel would require very low metal temperatures to avoid corrosion. Deposited ash was measured and expressed as a fraction of the total available ash. Both residual oil and a doped distillate fuel usng an in situ particulate probe were tested. Significant differences were found in the size and shape of particles produced. Two deposition tests were conducted at a turbine inlet temperature of 23000 F, representative of advanced designs. Severe deposition due to the large number of molten particles in the gas stream are indicated. DOE

N83-31028# Rockwell International Corp., Canoga Park, Calif. Energy Technology Engineering Center.
TESTING OF THE MANNESMANN DEMAG OXYGEN COMPRESSOR Final Report
Richard A. Granger 15 Dec. 1982 711 p
(Contract DE-AC03-76SF-00700)

(DE83-006801; ETEC-TDR-82-17) Avail: NTIS HC A99/MF A01

The test results from a successful test program that was performed on the Mannesmann Demag Oxygen HP-Compressor, 05 MV 4B are pesented. Testing included low and high-pressure nitrogen tests, oxygen performance tests, an oxygen steady-state test, and an oxygen maximum suctionpressure test. DOE

N83-31029# Creare, Inc., Hanover, N.H.
ASSESSMENT OF RESIDUAL HEAT REMOVAL AND CONTAINMENT SPRAY PUMP PERFORMANCE UNDER AIR AND DEBRIS INGESTING CONDITIONS
P. S. Kamath, T. J. Tantillo, and W. L. Swift Sep. 1982 107 p refs Sponsored by Nuclear Regulatory Commission
(DE83-900137; NUREG/CR-2792; CREARE/TM-825) Avail: NTIS HC A06/MF A01; also Avail: SOD $5.50

The performance of pumps during the recirculation phase of reactor core and containment cooldown following a loss-of-coolant accident was investigated. The pumped fluid is expected to contain debris such as insulation and may ingest air depending on sump conditions. Information collected from the literature and from interviews with pump and seal manufacturers show that for pumps at normal low rates operating with sufficient net positive suction head (NPSH), pump performance degradation is negligible if air ingestion quantities are less than 2% by volume. For air ingestion between 3% and 15% by volume, head degradation depends on individual pump design and operating conditions and for air quantities greater than 15% performance of most pumps will be fully degraded. Small quantities of air increase NPSH requirements for these pumps. For the types and quantities of debris likely to be present in the recirculating fluid, pump performance degradation is expected to be negligible. DOE

N83-31030# Sheffield Univ. (England). Dept. of Control Engineering.
MODELLING THE STEERING CHARACTERISTICS OF COAL FACE CONVEYORS BY RANDOM SIGNAL TESTING
J. B. Edwards and A. M. S. R. Yazdi Jan. 1983 32 p refs Presented at 4th IFAC Intern. Symp. on Automation in Mining, Mineral and Metal Processing, Helsinki, Aug. 1983 Sponsored by National Coal Board Mining Research and Development Establishment
(RR-208) Avail: NTIS HC A03/MF A01

A quarter-scale model of a coal cutting machine and armored flexible conveyor (AFC) system was subjected to random signal testing in an attempt to fit a continuous elastic beam model to the piecewise rigid AFC structure for vertical steering investigations. A roller track, over which the system is hauled at constant speed, provided the random test signal. A systems identification package generated the source signal noise and computed the cross correlation functions relating input and output height profiles. The results yield an equivalent elastic beam stiffness for the loose-coupled AFC structure that is considerably less than that originally anticipated, thus reconciling the hitherto opposing predictions for steering system stability produced by discrete and continuous models. Author (ESA)

N83-31031# Sandia Labs., Albuquerque, N. Mex.
LABORATORY TECHNIQUE FOR SIMULATION OF PROJECTILE PENETRATION INTO GEOLOGICAL TARGETS
Robert E. Setchell and Jose A. Guzman Jan. 1983 22 p refs (Contract DE-AC04-76DP-00789)
(DE83-006390; SAND-81-2029) Avail: NTIS HC A02/MF A01

A new aproach to laboratory-scale experiments on high-velocity penetration of projectiles into geological materials is demonstrated. This method utilizes a commercial accelerometer mounted within a small penetrator model that impacts a sample of target material. As in previous laboratory-scale experiments at high velocities, a compressed-gas gun is used in a reverse-ballistics configuration to accelerate a geological sample into an initially stationary penetrator. The present approach provides an acceleration history during the penetration, rather than displacement or velocity data as in these previous studies. Two experiments were conducted at each of two impact velocities using a conical-nosed penetrator and a simulated soft-sandstone target. The recorded accelerometer signals show high-frequency transducer resonances superimposed on the response expected for rigid-body accelertion. Direct recorded accelerometer signals show high-frequency transducer resonances superimposed on the response expected for rigid-body acceleration. Direct numerical techniques are used to extract the rigid-body acceleration history. DOE

N83-31032# Mitsubishi Heavy-Industries Ltd., Tokyo (Japan).
AUTOMATION OF WELDING OF HIGH TOUGHNESS SUPER-HIGH TENSION STEEL
Genta Takano, M. Hirose, and Tsutomu Toyohara 1982 33 p Transl. into ENGLISH from Mitsubishi Juko Giho (Japan), v. 4, 1982 33 p
(PB83-173609) Avail: NTIS HC A03/MF A01 CSCL 13G

High toughness superhigh tension steel of 80 kgf/sq mm class (proof stress 0.2%) is used for the inner hulls of submarines. High performance covered electrodes are used for welding this steel. To further stabilize the weld quality, a study was made of a MIG welding process which produces higher performance welds than arc welding process with covered electrode. A new welding process applying the oscillating process or pulsed arc welding process, as well as a welder suited to the joint shapes, was developed. Experimental results obtained show that the new welding process can automatically produce various kinds of joints of uniform quality. GRA

N83-31033# Nippon Steel Corp., Tokyo (Japan).
WELDING TECHNOLOGY FOR LNG TANKS
Tsuyoshi Takino and Rokuro Fujimoto 1983 20 p refs Transl. into ENGLISH of Seitetsu Kenkyu (Japan), no. 307, 1982
(PB83-159509) Avail: NTIS HC A02/MF A01 CSCL 13H

A description is given of the practical application of welding materials containing 70% nickel to the welding of 9% Ni steel. Covered electrodes have been increased in strength and further, the welding workability and microcrack resistance of the weld metal has been improved. Advances in automatic welding technology have induced an automatic welding wire having excellent cracking resistance fluxes for downward and three o'clock position arc welding having excellent workability and microfault resistance; and a one sided submerged arc welding method using a glass tape with a copper backing. The technologies described have all been applied to the welding of LNG tanks. GRA

N83-30686# Vibration Inst., Downers Grove, Ill.
MACHINERY VIBRATION EVALUATION TECHNIQUES
Ronald L. Eshleman *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 1 May 1982 p 67-79 refs (For primary document see N83-30684 19-31)
Avail: NTIS HC A07/MF A01 CSCL 13/9

N83-30687# Bently Nevada Corp., Minden.
SHAFT VIBRATION MEASUREMENT AND ANALYSIS TECHNIQUES
Donald E. Bently *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 1 May 1982 p 81-93 (For primary document see N83-30684 19-31)
Avail: NTIS HC A07/MF A01 CSCL 13/9

N83-30688# Westinghouse Research and Development Center, Pittsburgh, Pa.
SPIN TEST VIBRATIONS OF PENDULOUSLY SUPPORTED DISC/CYLINDER ROTORS
F. H. Wolff and A. J. Molnar *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 1 May 1982 p 95-100 refs (For primary document see N83-30684 19-31)
Avail: NTIS HC A07/MF A01 CSCL 13/9

N83-30763# GARD, Inc., Niles, Ill.
DYNAMIC MEASUREMENTS. AN ASSESSMENT OF THE COMMON CARRIER SHIPPING ENVIRONMENT
Fred E. Ostrem *In* Shock and Vibration Information Center The Shock and Vibration Bull., no. 50, part 2 Sep. 1980 p 83-90

refs 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 13I

N83-30808# Sandia Labs., Albuquerque, N. Mex. Explosives Testing Div.
PREDICTING THE MOTION OF FLYER PLATES DRIVEN BY LIGHT-INITIATED EXPLOSIVE FOR IMPULSE LOADING EXPERIMENTS
R. A. Benham *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50., Part 4 Sep. 1980 p 191-198 refs Sponsored in part by DOE (For primary document see N83-30794 19-31)
Avail: NTIS HC A11/MF A01 CSCL 20/11

N83-30810# Research Inst. of National Defence, Stockholm (Sweden).
EQUATIONS FOR DETERMINING FRAGMENT PENETRATION AND PERFORATION AGAINST METALS
Ingrid M. Gyllenspetz *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50., Part 4 Sep. 1980 p 213-222 refs (For primary document see N83-30794 19-31)
Avail: NTIS HC A11/MF A01 CSCL 13/9

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N83-31034# Electric Power Research Inst., Palo Alto, Calif. Systems and Materials Dept.
NONDESTRUCTIVE EVALUATION PROGRAM: PROGESS IN 1982
G. J. Dau, A. Armor, M. E. Lapides, S. N. Liu, T. Oldberg, and J. R. Quinn Feb. 1983 395 p refs Prepared in cooperation with COECORP.
(DE83-901877; EPRI-NP-2728-SR) Avail: NTIS HC A17/MF A01

This report presents a comprehensive review of the EPRI effort toward light water reactor inspection problems. Most of the report consists of contractor-supplied progress reports of each current project. An organizational plan of the program is presented in overview. Organization from several viewpoints is presented, e,g., in-service inspection operations, R & D personnel, and utility representatives. Information about the program organization is presented. Contractor-supplied progress eports of each current project are grouped by plant components pressure vessel, turbine, nozzle, etc. DOE

N83-31035# Arinc Research Corp., Annapolis, Md.
ROLE OF DESIGN COMPLEXITY IN FORECASTING RELIABILITY AND AVAILABLITY FOR ELECTRIC-POWER-GENERATING UNITS Final Report
D. M. Berkey and H. S. Balaban Oct. 1982 123 p refs Sponsored by Electric Power Research Inst.
(DE83-900746; EPRI-AP-2693) Avail: NTIS HC A06/MF A01

Multivariate regression analysis was applied to design complexity and reliability and availability performance data gathered from a representative sample of electric power generating units. Twelve predictive relationships or equations were developed as a result of employing this statistical procedure. Each equation was verified and assessed. Guidelines for applying the predictive relationships, including confidence limits, were also developed and are presented. A quantitative predictive tool that should be useful to the electric-power industry was developed. DOE

N83-31036# Siemens A.G., Munich (West Germany). Unternehmensbereich Bauelemente.
OPTIMIZATION OF QUALITY ASSURANCE PROCEDURE, SCREENING AND BURN IN OF COMPLEX MICROCIRCUITS: STUDY
R. Kappelmeyer, F. Beck, and W. Gerling Paris ESA Dec. 1981 121 p refs
(Contract ESTEC-3809/78/NL-HP)
(ESA-CR(P)-1726) Avail: NTIS HC A06/MF A01

The effectiveness of LSI quality assurance procedures was assessed from life test results on 6500 16 k bit dynamic RAM devices, operated up to 4000hr. Modes and frequency of the failure-causing defects were determined by analysis of the life test failures. Major failure modes are related to defects at oxide structures, contact holes, metallization lines and input protective devices, to surface contamination and wire bonded contacts. Improvements in design, material control, processing and process control were derived from the failure analysis. A second test phase on a similar number of devices and subsequent failure analysis confirm the intended improvements. Quality assurance procedures remained unchanged. For procurement, the definition of a reliability standard for the effectiveness of manufacturers' quality assurance procedures is proposed. Author (ESA)

N83-31037# Environmental Protection Agency, Washington, D.C. Office of Exploratory Research.
INTERIM GUIDELINES AND SPECIFICATIONS FOR PREPARING QUALITY ASSURANCE PROJECT PLANS
Thomas W. Stanley and S. Sidney Verner Feb. 1983 36 p refs (PB83-170514; EPA-600/4-83-004; OER-QAMS-005-80) Avail: NTIS HC A03/MF A01 CSCL 13H

The Agency-wide quality assurance policy stipulates that every monitoring and measurement project must have a written and approved Quality Assurance (QA) Project plan. This applies to extra-mural as well as internal projects. All successful applicants for financial assistance must therefore prepare and submit a quality Assurance Project Plan. This document describes the sixteen elements which must be considered for incusion in all Quality Assurance Project Plans and establishes criteria for plan preparation, review, and approval. All project plans must describe procedures which will be used to document and report precision, accuracy, representativeness, comparability, and completeness of environmental measurements. Author (GRA)

N83-30770# Army Electronics Command, Fort Monmouth, N. J. Technical Support Activity.
IMPROVING VIBRATION TECHNIQUES FOR DETECTING WORKMANSHIP DEFECTS IN ELECTRONIC EQUIPMENT
John W. Burt and Michael A. Condouris *In* Shock and Vibration Information Center The Shock and Vibration Bull., no. 50, part 2 Sep. 1980 p 173-190 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 14D

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N83-31038 National Maritime Inst., Feltham (England).
SLOWLY-VARYING SECOND-ORDER WAVE FORCES: THEORY AND EXPERIMENT
R. G. Standing, N. M. C. Dacunha, and R. B. Matten Oct. 1981 120 p refs Sponsored by Offshore Energy Technology Board
(NMI-R-138; OT-R-8211) Copyright. Avail: Issuing Activity

A computer program based on linear wave diffraction theory was used to compute horizontal drift and vertical components of the second order wave force. The basic theory, how slowly varying forces arise and cause a low-frequency response, and how forces in regular wave groups are related to forces in discrete and continuous irregular spectra are described. Numerical comparisons are used to identify the range of validity of existing approximate expressions and of the present program. It is shown that the

proposed program should be used at higher frequencies of the second order forces, while Newman approximation is sufficient at low frequencies. Author (ESA)

N83-31039 National Physical Lab., Teddington (England). Div. of Materials Applications.
UK16: PREDICTION OF INTERGRANULAR FAILURE IN Ni-Cr BASED ALLOYS IN LOW CYCLE FATIGUE AT HIGH TEMPERATURES European Concerted Action. Cost 50 - Materials for Gas Turbines Final Report
M. F. Day and G. B. Thomas 1983 60 p refs
(NPL-DMA(A)-62; ISSN-0143-7313) Avail: Issuing Activity

Specimens of IN597 and IN738LC alloys were tested mainly at 850 C using various strain-limited cycles including those with dwell periods in tension, compression or both. Post-test metallographic examination including measurements of damage due to cracks and cavities was carried out. It is found that the fractional life concept could be applied successfully to the results provided that modifications were made to allow analysis of data from tests involving stress-relaxation or compressive dwell periods. In the case of stress-relaxation an equivalent creep stress is evaluated from the stress levels at the beginning and end of the dwell period. Metallographic evidence shows that the failure mechanisms in IN597 and IN738LC are generally consistent with the assumptions underlying these modifications and the measurements of fracture damage in IN597 supported the basic assumptions implicit in the fractional life approach viz. that fatigue and creep damage develop independently and that failure is due to their additive effect. Author (ESA)

N83-31040# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
STRESS IN THIN CONICAL SHELLS DUE TO LINE LOADS
Santiago Alves Tavares and Wolf Altman (Inst. Tecnologico de Aeronautica) May 1983 14 p refs To be presented at the 7th Congr. Brasil. de Eng. Mecan., Uberlandia, Brazil, 13-16 Dec. 1983
(INPE-2752-PRE/328) Avail: NTIS HC A02/MF A01

The differential equation for the line loads uniformly distributed along a parallel circle is established from the homogeneous differential equations governing the bending behavior of a conical shell. The solution by means of the Green Functions is analyzed, the conditions to be satisfied and the form of the function for any supported condition. The complex Green Function constants are calculated and its form is modified for obtaining the real and complex parts of the function in adequate form and, following this, for developing the stress and strain expressions. Author

N83-31041# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ON THE THEORY OF FLEXURE
A. V. Krishna Murty May 1983 15 p refs To be presented at the 7th Congr. Brasil. de Eng. Mecan., Uberlandia, Brazil, 13-16 Dec. 1983
(INPE-2751-PRE/327) Avail: NTIS HC A02/MF A01

A new theory of flexure of beams and plates with provision for cubic variation of direct stress and parabolic variation of transverse shear across the depth of the structural element, is presented. In the present theory, certain limitations of the elementary shear deformation theories are avoided, yet, retaining their basic features which are appropriate. Governing equations of equilibrium and boundary conditions are given and the performance of the theory is indicated with the help of simple examples. Author

N83-31042# Aeronautical Systems Div., Wright-Patterson AFB, Ohio. Directorate of Flight Systems Engineering.
DAMAGE TOLERANCE EVALUATION OF THE ANTI-CAMOUT RIB (ACR) TORQ-SET RECESS FASTENERS Final Report, 1 Jun. 1981 - 1 Feb. 1982
Richard P. Stewart Jan. 1983 130 p
(AF Proj. 2098)
(AD-A126869; ASD(ENF)-TR-83-5001) Avail: NTIS HC A07/MF A01 CSCL 13/5

This report describes the latest effort in the continuation of the Air Force's technical evaluation of aerospace fastener recesses. Earlier work has investigated the prototype Anti-Camout Rib (ACR) recess design, i.e., one rib on each removal wall of the recess and the driver bit. This test program, at the request of the Secretary of Defense, evaluated the production configuration with multiple horizontal ribs on each removal wall of the driver bit and one vertical rib on each removal face of the fastener recess. This effort was confined predominantly to the damage tolerance testing of the following recess/driver bit combinations: (a) standard Torq-Set recess and standard Torq-Set driver bit, (b) ACR Torq-Set recess and ACT Torq-Set driver bit, (c) ACR Torq-Set recess with standard Torq-Set driver bit and (d) standard Torq-Set recess with ACR Torq-Set driver bit. Limited tests of the Torx recess fastener modified with 5 deg taper on the side wall of the recess were also conducted. This test program was coordinated with and approved by the Army and Navy. Besides the testing of the recesses, this effort was expanded to determine the cost and service benefits of the Anti-Camout Rib on the Torq-Set recess. GRA

N83-31043# California Univ., Berkeley. Dept. of Civil Engineering.
GLOBAL ANALYSIS METHODS FOR THE SOLUTION OF THE ELASTOPLASTIC AND VISCOPLASTIC DYNAMIC PROBLEMS
M. Ortiz and P. M. Pinsky 8 Jul. 1982 22 p refs
(Contract W-7405-eng-48)
(DE83-009319; UCRL-15522) Avail: NTIS HC A02/MF A01

The elastoplastic dynamic problem is formulated in a functional form that facilitates the application of the techniques of nonlinear semigroup theory. Existence and uniqueness of the solution is proved by showing that the equations of motion define a contraction semigroup in an adequate Hilbert space. Product formulas that result in computationally efficient algorithms are discussed. The approximation of solutions by linear and nonlinear viscoplastic models is studied. DOE

N83-31044# Los Alamos Scientific Lab., N. Mex.
AN INSTABILITY LOCALIZED AT THE INNER SURFACE OF AN IMPLODING SPHERICAL SHELL
S. J. Han 1983 16 p refs Presented at the American Physical Society Spring Meeting, Baltimore, 18 Apr. 1983
(DE83-011167; LA-UR-83-1087; CONF-830463-1) Avail: NTIS HC A02/MF A01

It is shown that, in an imploding spherical shell, the surface instabilities are of two different types. The fist, which occurs at the outer surfaces, is the Rayleigh-Taylor instability. The second instability occurs at the inner surface. This latter instability is not as disruptive as R-T modes, but it has three basic properties which differ considerably from those of the R-T instability: (1) it is oscillatory at early times; (2) grows faster in the long wavelength modes; and (3) it depends on the equation of state. It is further shown that this new instability is driven by amplified sound waves in the shell. DOE

N83-31045# Southwest Research Inst., San Antonio, Tex.
RESIDUAL STRESSES IN LP TURBINE DISCS Final Report
C. T. Robinson and G. R. Leverant Mar. 1983 39 p refs Sponsored by EPRI
(EPRI Proj. 1398-8)
(DE83-901954; EPRI-NP-2970) Avail: NTIS HC A03/MF A01

Bulk and surface residual stresses were determined for low-pressure turbine discs that had been retired from service. Bulk stresses were measured on four discs by the sectioning method and surface stresses on nine discs by the X-ray diffraction technique. Significant bulk tangential (hoop) stresses (20 to 30 ksi) were found in two discs. These stresses were compressive at the bore and tensile at the rim. Surface stresses varied considerably from disc to disc and at various locations on the same disc. The stresses ranged from -87 to +28 ksi. DOE

N83-31046# Los Alamos Scientific Lab., N. Mex.
PROGRAMMABLE CALCULATOR STRESS ANALYSIS

Leonard A. VanGulick 1983 23 p refs Presented at the 4th Natl. Congr. on Pressure Vessels and Piping, Portland, Oreg., 19-24 Jun. 1983
(Contract W-7405-eng-36)
(DE83-006055; LA-UR-83-147; CONF-830607-2) Avail: NTIS HC A02/MF A01

Advanced programmable alphanumeric calculators are well suited for closed-form calculation of pressure vessel stresses. They offer adequate computing power, portability, special programming features, and simple interactive execution procedures. Representative programs that demonstrate calculator capabilities are presented. Problems treated are stress and strength calculations in thick-walled pressure vessels and the computation of stresses near head/pressure-vessel junctures. DOE

N83-31047# Science Applications, Inc., San Leandro, Calif.
WELD RESIDUAL-STRESS REDISTRIBUTION NEAR GROWING CRACKS Final Report
D. F. Quinones and J. E. Reaugh Mar. 1983 73 p refs Prepared in cooperation with Science Applications, Inc., Albuquerque, N. Mex.
(EPRI Proj. 603-3)
(DE83-901986; EPRI-NP-2964) Avail: NTIS HC A04/MF A01

A numerical analysis representing Intergranular Stress Corrosion Cracking (IGSCC) in a residual stress field of the heat affected zone (HAZ) of a girth butt weld is presented. A complete, preexisting circumferential crack, growing radially outward in a 10 cm schedule 80 recirculation line, is modelled using the elastic properties of boiling water reactor (BWR) Type 304 stainless steel. An equilibrium solution for an uncracked pipe's residual stress field is applied as an initial condition; subsequent stresses are calculated incrementally, as the crack slowly propagates through the isothermal pipe wall. The elastic calculations show that the axial extent of the initial residual stress field has little influence on the stress intensification and crack arrest for extents greater than three pipe wall thicknesses. The current linear elastic fracture mechanics (LEFM) methods with residual stresses produce accurate stress intensity factor for the boundary conditions. DOE

N83-31048# Sandia Labs., Albuquerque, N. Mex.
TEMPERATURE AND DEFORMATION MICROSTRUCTURE DURING SHOCK COMPRESSION
D. E. Grady 1983 9 p refs Presented at the 185th Am. Chem. Soc. Natl. Meeting, Seattle, 20 Mar. 1983
(Contract DE-AC04-76DP-00789)
(DE83-008453; SAND-83-0640C; CONF-830303-11) Avail: NTIS HC A02/MF A01

Solids subjected to high velocity impact or explosive loading may undergo solid state or metallurgical transformation, or melting within time periods appreciably less than 10(+8)s, due to the intense shock pressure environment. Nonequilibrium features unique to the shock wave environment were identified in the shock transformation process. These features include heterogeneous shear deformation and temperature effects which appear to control the transformation kinetics and microstructure of the transformed material. Transformation under shock loading leads to unusual microstructure in recovered material and can result in interesting and useful changes in physical and mechanical properties. DOE

N83-31049# Hanford Engineering Development Lab., Richland, Wash. System Stress Analysis.
USNRC ANCHOR BOLT STUDY DATA SURVEY AND DYNAMIC TESTING Final Report
M. R. Lindquist Dec. 1982 84 p refs
(Contract DE-AC06-76FF-02170)
(DE83-005211; NUREG/CR-2999; HEDL-MISC-7246) Avail: NTIS HC A05/MF A01

A survey was performed to determine the adequacy of existing concrete expansion anchor test data. Based upon the survey findngs, additional dynamic testing to assess the benefits of preload was undertaken. Exploratory testing was performed on typical wedge and shell anchors. It was found that, providing the installation torque is properly applied, residual preload does not significantly affect anchor load-displacement characteristics until the preload drops to less than 50% of the full installation preload. It was concluded that this must be considered in design situations where support stiffness is an important factor. DOE

N83-31050# Earthquake Engineering Research Inst., Berkeley, Calif. Dept. of Civil Engineering.
MATHEMATICAL MODEL FOR THE RESPONSE OF MASONRY WALLS TO DYNAMIC EXCITATIONS
Haluk Sucuogolu (Middle East Technical Univ.), Yalcin Mengi (Middle East Technical Univ.), and Hugh D. McNiven Nov. 1982 135 p refs
(PB83-169011; UBC/EERC-82/244; NSF/CEE-82069) Avail: NTIS HC A07/MF A01 CSCL 13M

Masonry wall specimens were subjected to simulate earthquake ground motions, and horizontal and vertical periodic excitations. Evaluation of the experimental data indicates that the first two model frequencies are close to each other. This is attributed, on physical grounds, to strong interaction between the brick and mortar phases of the wall. Hence, a two phase mathematical model (mixture model) is chosen to describe the wall behavior because of its capability of differentiating between the two phases of the wall and of taking into account the interaction between them. The equations of the mixture model are put into a discrete form to simplify the analysis. The parameters appearing in the model are determined, through optimization, by matching theoretical and experimental responses in frequency space. GRA

N83-31051# Los Alamos Scientific Lab., N. Mex. Dept. of Mechanical Engineering.
BUCKLING INVESTIGATION OF RING-STIFFENED CYLINDRICAL SHELLS WITH REINFORCED OPENINGS UNDER UNSYMMETRICAL AXIAL LOADS
W. Baker and J. Bennett Feb. 1983 49 p refs
(Contract W-7405-eng-36)
(DE83-008685; LA-9646-MS; NUREG/CR-3135; NC-A7222) Avail: NTIS HC A03/MF A01

Four steel shells having features representative of steel containment vessels for nuclear power plants were fabricated and tested to failure under unsymmetrical axial loading. All of the ring-stiffened shells were 698 mm (27.5 in.) in diam by 0.762 mm (0.030 in.) in wall thickness. Each one had a penetration that was reinforced in accordance with the area-replacement rule of the applicable American Society of Mechanical Engineers (ASME) code and of a design to simulate actual practice for steel containments. The penetrations were of four different diameters, cutting no ring stiffeners, and cutting one-, two-, and three-ring stiffeners. Before testing, imperfections were measured, and strain gages were applied to characterize the strain field at end and around the penetration. Buckling loads were determined. DOE

N83-31052# California Univ., Livermore. Lawrence Livermore Lab.
DETERMINATION OF YIELD STRENGTH (Y DEG) FOR BALLISTICALLY IMPACTED CYLINDERS OF BERYLLIUM
C. A. Honodel 19 Oct. 1982 9 p refs
(Contract W-7405-eng-48)
(DE83-002460; UCID-19581) Avail: NTIS HC A02/MF A01

Two Be materials were added to the table of projectile materials. The resulting yield strength values varied 0.0062 to 0.0101. DOE

N83-31053# Los Alamos Scientific Lab., N. Mex.
NUMERICAL SIMULATION OF FRACTURE
Leonard G. Margolin 1983 9 p refs Presented at the Intern. Conf. on Constitutive Laws for Eng. Mater.: Theory and Appl., Tucson, Ariz., 10-14 Jan. 1983
(Contract W-7405-eng-36)
(DE82-019532; LA-UR-82-2167; CONF-830104-3) Avail: NTIS HC A02/MF A01

A constructive model for brittle, and quasi-brittle materials is described. The Bedded Crack Model contains a microphysical

description of fracture based on Griffith theory. The effect of cracks on material properties is described by effective modulus theory. Underlying the model is a statistical framework in which the evolution in time of a statistical distribution of cracks is calculated. The theory upon which the model is based is described. The model is implemented in a finite difference computer code and is contrasted with the phenomenologic models usually found in computer codes. A computational simulation of the strain rate dependence of failure stress is presented and compared with laboratory data. A simulation of a gas gun experiment is presented, and the mechanism of spall described. DOE

N83-31054# Cornell Univ., Ithaca, N. Y. Dept. of Structural Engineering.

BEHAVIOR OF REINFORCED CONCRETE SLABS SUBJECTED TO COMBINED PUNCHING SHEAR AND BIAXIAL TENSION

W. C. Jau, R. N. White, and P. Gergely Sep. 1982 102 p refs Sponsored by Nuclear Regulatory Commission

(DE83-900106; NUREG/CR-2920) Avail: NTIS HC A06/MF A01; also Avail: SOD HC $5.50

The peripheral (punching) shear strength of precracked, biaxially tensioned, orthogonally reinforced concrete slabs was investigated to determine the strength of a reinforced concrete containment vessel wall when subjeced to combined internal pressure and punching shear loads normal to the wall. The shear span, size of loaded area, and reinforcing steel ratio on punching shear strength of slabs that were precracked in biaxial tension and then held at one of the two tension levels (0 or 0.8f/sub y/) during shear load application is discussed. DOE

N83-31055# Karlsruhe Univ. (West Germany). Versuchsanstalt fuer Stahl, Holz und Steine.

PRACTICAL BUCKLING LOADS OF ORTHOTROPIC CIRCULAR CYLINDRICAL SHELLS IN THEORY AND TESTING [PRAKTISCHE BEULLASTEN ORTHOTROPER KREIXZLINDERSCHALEN IN THEORIE UND VERSUCH]

M. Pfeiffer 1982 182 p refs In GERMAN

(Rept-5) Avail: NTIS HC A09/MF A01

An method for analyzing shell deformation was developed. A stiffness scheme which smooths out stiffnesses and reduces the shells to constructions which are uniform or mainly circumferentially stiffened was assumed. The calculation method takes into account multiple, extremely complex disturbances. It allows an immune proof of the total stability of medium-long isotropic and orthotropic cylindrical shells, i.e., stiffened in longitudinal and circumferential direction, under axial load for elastic as well as plastic buckling. Author (ESA)

N83-31056# GKSS-Forschungszentrum Geesthacht (West Germany). Inst. fuer Anlagentechnik.

FINITE ELEMENT ANALYSIS TO PROVIDE A CALIBRATION CURVE FOR A SINGLE-EDGED-NOTCHED BEND (SENB) SPECIMEN TO APPLY THE ELECTRICAL POTENTIAL METHOD TO CRACK LENGTH MEASUREMENTS [FINITE-ELEMENT-ANALYSE ZUR ERMITTLUNG DER EICHKURVE FUER EINE DREIPUNKT-BIEGEPROBE (SENB-PROBE) ZUR ANWENDUNG DER ELEKTRISCHEN POTENTIAL METHODE FUER RISSLAENGENMESSUNG]

R. Dietrich 1982 27 p refs In GERMAN; ENGLISH summary (GKSS-82-E-38; ISSN-0344-9629) Avail: NTIS HC A03/MF A01

Calibration curves for an electrical potential crack-monitoring system were obtained. The results show the stationary distribution of the electrical potential in the specimen and the deduced calibration curves. Comparison of these numerically determined curves with experimental and analytical curves shows that the finite element method is accurate. The method is especially useful for complicated two and three dimensional specimens, for which an analytical method is impossible and experimental determination is too expensive. Author (ESA)

N83-31057# Oxford Univ. (England). Engineering Lab.

MAXIMUM STRENGTH/STIFFNESS DESIGN ON STRUCTURAL MEMBERS IN PRESENCE OF SELF-WEIGHT

B. L. Karihaloo and W. S. Hemp Nov. 1982 23 p refs Sponsored by Nuffield Foundation

(OUEL-1443/82) Avail: NTIS HC A02/MF A01

The maximum strength/stiffness design of tension/compression and flexural members under the influence of their own weight as well as given external forces is studied. The Euler-Bernoulli flexural theory and the solutions for the case of weightless members are reviewed. The variational problem corresponding to the optimization problem is analyzed deriving the optimality condition (Euler equation) required to obtain an approximate solution. In cases where analytical solutions cannot be obtained, solutions derived by succesive approximation are given. Author (ESA)

N83-31058# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).

CALCULATING THE STATIC STABILITY OF STRUCTURES BY APPLICATION OF THE FINITE ELEMENT METHOD Final Report

Armin Fix Bonn Bundesministerium der Verteidigung 1982 172 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium der Verteidigung

(BMVg-FBWT-82-8) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 40

The finite element computer system FEST was developed to calculate static stability of general, thin walled shell structures. The derivatives of 0, 1, 2 order to the quintic components are introduced as degrees of freedom. Fully automatic calculations are possible with up to 10,000 degrees of freedom. The graphic results are presented in 3-D and as displays of contour lines. The stability limit is in the first bifurcation point and is calculated from an eigenvalue problem. On the assumption of the Kirchhoff hypothesis, the terms were formulated for plate, membrane, conical shell and flat shell. Calculations reveal a variety of typical stability phenomena from the mechanical aspect. The effects of stiffening measures and cutouts are demonstrated. Qualitative statements on nonlinear stability behavior can be made from the study of eigenvalues and the velocity of convergence for the iteration process. Author (ESA)

N83-31059# Structural Engineering Research Centre, Madras (India).

JOURNAL OF STRUCTURAL ENGINEERING: VOLUME 9, NUMBER 1

B. Bhattacharyya, S. P. Ray, G. S. Pandit, and V. Venkappa Apr. 1982 38 p refs

(PB83-166777) Avail: NTIS HC A03/MF A01 CSCL 13C

Topics discussed cover (1) analysis of shallow spherical shells on isosceles right-angled triangular plan area; (2) a short review of literature on reinforced concrete deep beams with and without opening in web; and (3) precracking torsional stiffness of concrete members. GRA

N83-31060# National Bureau of Standards, Washington, D.C. Fracture and Deformation Div.

FRACTURE TOUGHNESS OF STEEL WELDMENTS FOR ARCTIC STRUCTURES Interim Progress Report

T. L. Anderson and H. I. McHenry Dec. 1982 86 p refs Sponsored by Dept. of the Interior

(PB83-164152; NBSIR-83-1680) Avail: NTIS HC A05/MF A01 CSCL 13A

Progress in the development of fracture criteria for steel weldments in arctic structures is described. Tensile, Charpy-impact and fracture toughness properties were measured as a function of temperature for a 25.4 mm (1in) thick plate of normalized steel. Fracture toughness tests were performed on five geometries of single-edge notched bend (SENB) specimens. Critical values of the J-integral and the crack-tip opening displacement were computed and plotted versus temperature. The ductile-to-brittle transition temperature increased with increasing specimen thickness, and crack length. The effect of specimen geometry on fracture toughness is attributed to changes in crack-tip region

constraint with geometry. Initial attempts to model this behavior were moderately successful. GRA

N83-31061# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
SOME CONSIDERATIONS ON SHORT CRACK GROWTH BEHAVIOUR IN AIRCRAFT STRUCTURES
Loughton, England Mar. 1983 30 p refs (AGARD-R-696; ISBN-92-835-1446-7) Avail: NTIS HC A03/MF A01

The two papers included in this Report were presented at the 52nd Meeting of the Structures and Materials Panel as the first stage of a study of the problems encountered in predicting the behavior of short cracks. The fracture mechanics approach is being used for fatigue life assessment and durability evaluation of aircraft structures. Conventional crack growth prediction methods applied to smaller crack length ranges have met limited success so far. Short cracks may grow somewhat faster than expected by predictions using fracture mechanics data obtained from long crack specimens. The behavior of short cracks obviously is affected by some analysis and additional secondary loading effects not normally accounted for in the stress intensity determination but having likely effects in short crack growth. For individual titles, see N83-31062 through N83-31063.

N83-31062# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
EVALUATION OF SMALL CRACKS IN AIRFRAME STRUCTURES
Howard A. Wood (Aeronautical Systems Div.), James L. Rudd, and John M. Potter *In* AGARD Some Considerations on Short Crack Growth Behaviour in Aircraft Struct. Mar. 1983 12 p refs (For primary document see N83-31061 19-39)
Avail: NTIS HC A03/MF A01

Small crack technology applications to airframe structures are discussed. Cracks with the size range of 1/10mm to 1mm have been used as the starting point for evaluating the safe and durable operational limits of older in-service aircraft and as criteria for the design of new structures. The development of these criteria are presented. Evidence of service cracking obtained from teardown inspections is presented to illustrate the characteristic sizes and shapes of cracks at structural fastener holes. Current methods for predicting growth are judged to be less developed than for cracks in larger size ranges. A limited comparison of test and prediction is included. Finally, the influence of small cracks on residual strength and the potential degradation of fail safety are discussed with specific reference to a large transport aircraft. The authors conclude that the analysis of small crack growth behavior is far more complex than for intermediate and large sizes, and suggest additional research particularly the development of experimental data to support methodology development. Author

N83-31063# Royal Aircraft Establishment, Farnborough (England).
A REVIEW OF CRACK GROWTH THRESHOLD AND CRACK PROPAGATION RATES AT SHORT CRACK LENGTHS
R. F. W. Anstee and P. R. Edwards *In* AGARD Some Considerations on Short Crack Growth Behaviour in Aircraft Struct. Mar. 1983 12 p refs (For primary document see N83-31061 19-39)
Avail: NTIS HC A03/MF A01

An initial flaw of 0.127 mm (0.005 inch) is specified to exist at every hole, with larger flaws at the most critical locations. This does not mean however that no account is taken of fatigue crack initiation time; since the flaw specified is in practice an equivalent initial flaw which, using current crack propagation prediction techniques, gives a fatigue life which is equivalent to lives typical of service experience. Author

N83-30490# Istituto di Tecnologia Aerospaziale, Rome (Italy).
STRUCTURAL DAMPING OF COMPOSITE MATERIALS FOR SPACE APPLICATIONS
Luigi Balis-Crema, Renato Barboni, and Antonio Castellani *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 8 p refs Sponsored in part by Ministero Pubblica Istruzione (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01

N83-30492# Toronto Univ. (Ontario). * Inst. for Aerospace Studies.
THE EFFECT OF SPACE ENVIRONMENT ON THE DAMPING OF POLYMER MATRIX COMPOSITE
R. C. Tennyson, W. D. Morison, and G. E. Mabson *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 15 p refs Sponsored in part by Natural Sciences and Engineering Research Council of Canada (For primary document see N83-30479 19-12) (Grant AF-AFOSR-3694-78)
Avail: NTIS HC A10/MF A01

N83-30685*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
REQUIRED DEVELOPMENTS IN STRUCTURAL DYNAMICS
Ben K. Wada *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 1 May 1982 p 49-54 (For primary document see N83-30684 19-31)
Avail: NTIS HC A07/MF A01 CSCL 20K

N83-30690# Institut National des Sciences Appliquees de Lyon, Villeurbanne (France). Lab. de Mecanique des Structures.
CONTRIBUTION TO THE DYNAMIC BEHAVIOUR OF FLEXIBLE MECHANISMS
E. Imam, J. derHagopian, and M. Lalanne *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 1 May 1982 p 125-133 refs (For primary document see N83-30684 19-31)
Avail: NTIS HC A07/MF A01 CSCL 20/11

N83-30691# Texas Technological Univ., Lubbock. Dept. of Mechanical Engineering.
SELF-EXCITED VIBRATION OF A NONLINEAR SYSTEM WITH RANDOM PARAMETERS
Raouf A. Ibrahim *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 1 May 1982 p 135-144 refs (For primary document see N83-30684 19-31)
Avail: NTIS HC A07/MF A01 CSCL 20/11

N83-30694*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SPACE SHUTTLE SOLID ROCKET BOOSTER WATER ENTRY CAVITY COLLAPSE LOADS
R. T. Keefe (Chrysler Corp.), E. A. Rawls (Chrysler Corp.), and D. A. Kross *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 21-26 refs (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 20K

N83-30723# General Electric Co., Utica, N. Y. Aircraft Equipment Div.
FATIGUE LIFE PREDICTION FOR VARIOUS RANDOM STRESS PEAK DISTRIBUTIONS
Ronald G. Lambert *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 1-10 refs (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

N83-30724# Waterloo Univ. (Ontario). Dept. of Civil Engineering.
FATIGUE LIFE EVALUATION, STOCHASTIC LOADING, AND MODIFIED LIFE CURVES
M. ElMenoufy, H. H. E. Leipholz, and T. H. Topper *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 11-19 refs Sponsored in part by National Research Council of Canada (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

N83-30725# Hughes Aircraft Co., Culver City, Calif.
THE EFFECTS OF ENDURANCE LIMIT AND CREST FACTOR

ON TIME TO FAILURE UNDER RANDOM LOADING
Allen J. Curtis and Sally M. Moite *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 21-31 refs (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

N83-30727# Naval Surface Weapons Center, White Oak, Md.
FORCED VIBRATIONS OF A LARGE DAMPED MECHANICAL SYSTEM
David W. Nicholson *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 33-36 refs (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

N83-30728# Morrow (Charles T.), Encinitas, Calif.
INDIRECT FOURIER TRANSFORM (IFT) AND SHOCK RESPONSE: A DETAILED PRESENTATION OF BASIC THEORY
Charles T. Morrow *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 37-45 refs (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

N83-30732# Concordia Univ., Montreal (Quebec).
NONLINEAR ANALYSIS OF PNEUMATIC GENERATORS USED FOR VIBRATION CONTROL
S. Sankar, R. R. Guntur (Union Coll.), and S. G. Kalambur (Electronics Associates Inc.) *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 87-101 refs Sponsored in part by Natural Science and Engineering Council of Canada (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

N83-30734# Martin Marietta Aerospace, Orlando, Fla.
RUBBER ISOLATORS FOR THE ADATS MISSILE
Jean-Pierre Frottier (Oerlikon-Buehrle Werkzeugmaschinenfabrik) and Clifford S. O'Hearne *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 1-10 ref (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 16/4

N83-30735# Naval Sea Systems Command, Washington, D. C.
TIME AND TEMPERATURE EFFECTS ON CUSHIONS
Gordon S. Mustin *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 131-140 refs (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

N83-30736# Queensland Univ., St. Lucia (Australia). Dept. of Mechanical Engineering.
EXTRANEOUS EFFECTS IN DAMPING MEASUREMENT
Robert J. Hooker and S. Prasertsan (Prince of Songkla Univ.) *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 1-10 refs (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

N83-30737# Chinese Academy of Sciences, Peking. Inst. of Mechanics.
DYNAMIC ANALYSIS OF A LARGE STRUCTURE WITH ARTIFICIAL DAMPING
Q. L. Tian, D. K. Liu, Y. P. Li, and D. F. Wang *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 147-153 refs (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

N83-30738# Chinese Academy of Sciences, Peking. Inst. of Mechanics.
AN EXPERIMENTAL STUDY OF THE NON-LINEAR BEHAVIOUR OF A STRANDED CABLE AND DRY FRICTION DAMPER
C. S. Chang and Qianli L. Tian *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 155-160 refs (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

N83-30741# Dayton Univ., Ohio.
DAMPED STRUCTURE DESIGN USING FINITE ELEMENT ANALYSIS
Matthew F. Kluesener and Michael L. Drake *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52., Part 5 May 1982 p 1-12 refs (For primary document see N83-30740 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

N83-30742*# Old Dominion Univ., Norfolk, Va. Dept. of Mechanical Engineering and Mechanics.
DETERMINATION OF NORMAL MODES FROM MEASURED COMPLEX MODES
S. R. Ibrahim *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 5 May 1982 p 13-17 refs Sponsored in part by NASA. Langley Research Center (For primary document see N83-30740 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20K

N83-30743# Minnesota Univ., Minneapolis. Dept. of Mechanical Engineering.
THE EFFECT OF JOINT PROPERTIES ON THE VIBRATION OF TIMOSHENKO FRAMES
I. Yaghmai (Sharif Univ. of Technology) and D. A. Frohrib *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 5 May 1982 p 19-27 refs (For primary document see N83-30740 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

N83-30745# Army Armament Research and Development Command, Watervliet, N. Y. Large Caliber Weapon Systems Lab.
FINITE ELEMENTS FOR INITIAL VALUE PROBLEMS IN DYNAMICS
T. E. Simkins *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 5 May 1982 p 39-47 refs (For primary document see N83-30740 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

N83-30746# State Univ. of New York, Buffalo. Dept. of Mechanical and Aerospace Engineering.
A PROCEDURE FOR DESIGNING OVERDAMPED LUMPED PARAMETER SYSTEMS
Daniel J. Inman and Albert N. Andry, Jr. (Lockheed-California Co.) *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 5 May 1982 p 49-53 refs (For primary document see N83-30740 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

N83-30747# Virginia Univ., Charlottesville.
ON THE OPTIMAL LOCATION OF VIBRATION SUPPORTS
B. P. Wang and W. D. Pilkey *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 5 May 1982 p 55-58 refs (For primary document see N83-30740 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

N83-30748# Naval Ship Research and Development Center, Bethesda, Md.
DYNAMIC BUCKLING OF PINNED COLUMNS
J. M. Ready *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 5 May 1982 p 59-98 refs (For primary document see N83-30740 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

N83-30751# Weidlinger Associates, Menlo Park, Calif.
DAMPING OF SHALLOW-BURIED STRUCTURES DUE TO SOIL-STRUCTURE INTERACTION
Felix S. Wong and Paul Weidlinger *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 5 May 1982 p 149-154 refs (For primary document see N83-30740 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/11

N83-30754# Boeing Aerospace Co., Seattle, Wash.
DYNAMIC ANALYSIS AND DESIGN: CHALLENGE FOR THE FUTURE

Robert W. Hager *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Pt. 1 Sep. 1980 p 17-25 (For primary document see N83-30752 19-31)
Avail: NTIS HC A04/MF A01 CSCL 20/11

N83-30755# Army Materials and Mechanics Research Center, Watertown, Mass.
SHOCK IN SOLIDS: ARMY MATERIALS RESEARCH AND APPLICATIONS
R. Shea and J. F. Mescall *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Pt. 1 Sep. 1980 p 27-38 refs (For primary document see N83-30752 19-31)
Avail: NTIS HC A04/MF A01 CSCL 20/11

N83-30756# Hughes Aircraft Co., Culver City, Calif.
DYNAMIC TESTING: HOW FAR WE'VE COME; HOW MUCH FURTHER TO GO
Allen J. Curtis *In* Shock and Vibration Information Center The Shock and Vibration Bull., No. 50, Pt. 1 Sep. 1980 p 39-44 (For primary document see N83-30752 19-31)
Avail: NTIS HC A04/MF A01 CSCL 20/11

N83-30760# Westinghouse-Bettis Atomic Power Lab., Pittsburgh, Pa.
A METHOD FOR EXPERIMENTALLY DETERMINING ROTATIONAL MOBILITIES OF STRUCTURES
Stanley S. Sattinger *In* Shock and Vibration Information Center The Shock and Vibration Bull., no. 50, part 2 Sep. 1980 p 17-28 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 20/11

N83-30764# Department of Agriculture, Beltsville, Md. Transportation and Packaging Research Branch.
SHOCK AND VIBRATION ENVIRONMENT IN A LIVESTOCK TRAILER
M. T. Turczyn, D. G. Stevens, and T. H. Camp *In* Shock and Vibration Information Center The Shock and Vibration Bull, no. 50, part 2 Sep. 1980 p 91-101 refs 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 20/11

N83-30765# Pacific Missile Test Center, Point Mugu, Calif.
SHOCK INDUCED IN MISSILES DURING TRUCK TRANSPORT
D. B. Meeker and J. A. Sears *In* Shock and Vibration Information Center The Shock and Vibration Bull., no. 50, part 2 Sep. 1980 p 103-120 refs 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 20/11

N83-30766# Gilbert/Commonwealth, Jackson, Mich.
DYNAMIC CHARACTERISTICS OF AN INDUCED-DRAFT FAN AND ITS FOUNDATION
S. P. Ying and E. E. Dennison *In* Shock and Vibration Information Center The Shock and Vibration Bull., no. 50, part 2 Sep. 1980 p 121-128 refs 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 20/11

N83-30767# IFM Akustibyran A.B., Stockholm (Sweden).
VIBRATION AND ACOUSTICS. A METHOD TO DETERMINE REALISTIC RANDOM VIBRATION TEST LEVELS TAKING INTO ACCOUNT MECHANICAL IMPEDANCE DATA. PART 1: BASIC IDEAS AND THEORY
Odd Sylwan *In* Shock and Vibration Information Center The Shock and Vibration Bull., no. 50, part 2 Sep. 1980 p 129-135 ref 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 20/11

N83-30768# Saab-Scania, Linkoping (Sweden).
A METHOD TO DETERMINE REALISTIC RANDOM VIBRATION TEST LEVELS TAKING INTO ACCOUNT MECHANICAL IMPEDANCE DATA. PART 2: VERIFICATION TESTS
Tryggve Hell *In* Shock and Vibration Information Center The Shock and Vibration Bull., no. 50, part 2 Sep. 1980 p 137-154 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 20/11

N83-30772# Sandia Labs., Albuquerque, N. Mex.
BIAS ERRORS IN A RANDOM VIBRATION EXTREMAL CONTROL STRATEGY
D. O. Smallwood and D. L. Gregory *In* Shock and Vibration Information Center The Shock and Vibration Bull., no. 50, part 2 Sep. 1980 p 199-205 ref 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 20/11

N83-30779# Ohio State Univ., Columbus. Dept. of Engineering Mechanics.
THE RELATIVE COMPLEXITIES OF PLATE AND SHELL VIBRATIONS
A. W. Leissa *In* Shock and Vibration Bulletin, no. 50, part 3 Sep. 1980 p 1-10 refs (For primary document see N83-30778 19-31)
Avail: NTIS HC A10/MF A01 CSCL 20/11

N83-30780# Naval Underwater Systems Center, Newport, R.I.
IN-FLUID CYLINDRICAL BEAM VIBRATION WITH MULTI-DEGREE OF FREEDOM ABSORBERS
B. E. Sandman and J. S. Griffin *In* Shock and Vibration Bulletin, no. 50, part 3 Sep. 1980 p 11-20 refs (For primary document see N83-30778 19-31)
Avail: NTIS HC A10/MF A01 CSCL 20/11

N83-30784# Westinghouse Research and Development Center, Pittsburgh, Pa.
DYNAMICS OF LONG VERTICAL CABLES
F. H. Wolff *In* Shock and Vibration Bulletin, no. 50, part 3 Sep. 1980 p 63-70 refs (For primary document see N83-30778 19-31)
Avail: NTIS HC A10/MF A01 CSCL 20/11

N83-30785# Florida Univ., Eglin AFB. Graduate Engineering Center.
RESPONSE AND FAILURE OF UNDERGROUND REINFORCED CONCRETE PLATES SUBJECTED TO BLAST
C. A. Ross, C. C. schauble, and P. T. Nash (USAF Armament Lab., Eglin AFB, Fla.) *In* Shock and Vibration Bulletin, no. 50, part 3 Sep. 1980 p 71-82 refs (For primary document see N83-30778 19-31)
(Grant AF-AFOSR-3592-78)
Avail: NTIS HC A10/MF A01 CSCL 20/11

N83-30786*# Old Dominion Univ., Norfolk, Va. Dept. of Mechanical Engiering and Mechanics.
LIMITATIONS ON RANDOM INPUT FORCES IN RANDOMDEC COMPUTATION FOR MODAL IDENTIFICATION
S. R. Ibrahim *In* Shock and Vibration Bulletin, no. 50, part 3 Sep. 1980 p 99-112 refs Sponsored in part by NASA (For primary document see N83-30778 19-31)
Avail: NTIS HC A10/MF A01 CSCL 20K

N83-30787# Bonneville Power Administration, Portland, Oreg.
STRUCTURAL-DYNAMIC CHARACTERIZATION OF AN EXPERIMENTAL 1200-KILOVOLT ELECTRICAL TRANSMISSION-LINE SYSTEM
Leon Kempner, Jr., Strether Smith (Synergistic Technology, Inc., Cupertino, Calif.), and Richard C. Stroud (Synergistic Technology, Inc., Cupertino, Calif.) *In* Shock and Vibration Bulletin, no. 50, part 3 Sep. 1980 p 113-124 refs (For primary document see N83-30778 19-31)
Avail: NTIS HC A10/MF A01 CSCL 20/11

N83-30792# General Electric Co., Utica, N. Y. Aircraft Equipment Div.
FATIGUE LIFE PREDICTION FOR MULTILEVEL STEP-STRESS APPLICATIONS
Ronald G. Lambert *In* Shock and Vibration Bulletin, no. 50, part 3 Sep. 1980 p 189-200 refs (For primary document see

N83-30778 19-31)
Avail: NTIS HC 10/MF A01 CSCL 20/11

N83-30793# Westinghouse Research and Development Center, Pittsburgh, Pa.
LATERAL INSTABILITY DURING SPIN TESTS OF A PENDULOUSLY SUPPORTED DISC
F. H. Wolff, A. J. Molnar, G. O. Sankey, and J. H. Bitzer *In* Shock and Vibration Bulletin, no. 50, part 3 Sep. 1980 p 201-208 refs (For primary document see N83-30778 19-31)
Avail: NTIS HC A10/MF A01 CSCL 20/11

N83-30797# Alabama Univ., Huntsville. Dept. of Industrial and Systems Engineering.
MODELING A TEMPERATURE SENSITIVE CONFINED CUSHIONING SYSTEM
Virginia P. Kobler (Army Missile Command), Richard M. Wyskida, and James D. Johannes *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50., Part 4 Sep. 1980 p 25-34 refs (For primary document see N83-30794 19-31)
Avail: NTIS HC A11/MF A01 CSCL 20/11

N83-30798# Army Engineer Div., Huntsville, Ala.
PRELIMINARY HARDNESS EVALUATION PROCEDURE FOR IDENTIFYING SHOCK ISOLATION REQUIREMENTS
Richard J. Bradshaw, Jr. and Paul N. Sonneburg (Army Construction Engineering Research Lab.) *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50., Part 4 Sep. 1980 p 35-58 refs (For primary document see N83-30794 19-31)
Avail: NTIS HC A11/MF A01 CSCL 20/11

N83-30799# Commonwealth Scientific and Industrial Research Organization, Sydney (Australia). Div. of Applied Physics.
AN APPLICATION OF TUNED MASS DAMPERS TO THE SUPPRESSION OF SEVERE VIBRATION IN THE ROOF OF AN AIRCRAFT ENGINE TEST CELL
J. L. Goldberg, N. H. Clark, and B. H. Meldrum *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50., Part 4 Sep. 1980 p 59-68 refs (For primary document see N83-30794 19-31)
Avail: NTIS HC A11/MF A01 CSCL 20/11

N83-30800# Lord Kinematics, Erie, Pa.
COMPARISON OF ANALYTICAL AND EXPERIMENTAL RESULTS FOR A SEMI-ACTIVE VIBRATION ISOLATOR
E. J. Krasnicki *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50., Part 4 Sep. 1980 p 69-76 refs (For primary document see N83-30794 19-31)
Avail: NTIS HC A11/MF A01 CSCL 20/11

N83-30802# General Electric Co., Philadelphia, Pa. Space Div.
DYNAMIC INTEGRITY METHODS INCLUDING DAMPING FOR ELECTRONIC PACKAGES IN RANDOM VIBRATION
J. M. Medaglia *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50., Part 4 Sep. 1980 p 91-104 refs (For primary document see N83-30794 19-31)
Avail: NTIS HC A11/MF A01 CSCL 20/11

N83-30803# Technische Hochschule, Darmstadt (West Germany). Inst. fuer Mechanik.
AN OVERVIEW OF SHOCK ANALYSIS AND TESTING IN THE FEDERAL REPUBLIC OF GERMANY
K.-E. Meier-Doernberg *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50., Part 4 Sep. 1980 p 105-116 refs (For primary document see N83-30794 19-31)
Avail: NTIS HC A11/MF A01 CSCL 20/11

N83-30804# New Mexico Univ., Albuquerque.
CONSERVATISM IN SHOCK ANALYSIS AND TESTING
Thomas L. Paez *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50., Part 4 Sep. 1980 p 117-136 refs (For primary document see N83-30794 19-31)
Avail: NTIS HC A11/MF A01 CSCL 20/11

N83-30805# Agbabian Associates, El Segundo, Calif.
MEASUREMENT OF DYNAMIC STRUCTURAL CHARACTERISTICS OF MASSIVE BUILDINGS BY HIGH-LEVEL MULTIPULSE TECHNIQUES
D. G. Yates and F. B. Safford *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50., Part 4 Sep. 1980 p 137-148 refs (For primary document see N83-30794 19-31)
Avail: NTIS HC A11/MF A01 CSCL 20/11

N83-30806# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Mechanical Engineering.
CONSIDERATION OF AN OPTIMAL PROCEDURE FOR TESTING THE OPERABILITY OF EQUIPMENT UNDER SEISMIC DISTURBANCES
C. W. deSilva, F. Loceff (Westinghouse Nuclear Energy Systems), and K. M. Vashi (Westinghouse Nuclear Energy Systems) *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50., Part 4 Sep. 1980 p 149-158 refs (For primary document see N83-30794 19-31)
Avail: NTIS HC A11/MF A01 CSCL 20/11

N83-30807# Florida Univ., Gainesville. Dept. of Engineering Sciences.
DYNAMIC LOADING OF METAL RIVETED JOINTS
R. L. Sierakowski, C. A. Ross, J. Hoover, and W. S. Strickland (Air Force Armament Lab.) *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 50., Part 4 Sep. 1980 p 159-174 refs (For primary document see N83-30794 19-31) (Grant AF-AFOSR-3157-76)
Avail: NTIS HC A11/MF A01 CSCL 20/11

N83-31178 Texas Technological Univ., Lubbock. Dept. of Electrical Engineering.
SOME RESULTS AND LIMITATIONS OF PRONY ANALYSIS OF IN-FLIGHT LIGHTNING DATA
T. F. Trost, C. D. Turner, and C.-T. Wen *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 8 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

42 GEOSCIENCES (GENERAL)

No abstracts in this category.

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N83-31064* National Aeronautics and Space Administration, Washington, D. C.
EARTH RESOURCES: A CONTINUING BIBLIOGRAPHY WITH INDEXES
Jul. 1983 171 p
(NASA-SP-7041(38); NAS 1.12/7:7041(38)) Avail: NTIS HC $12.00 CSCL 05B

This bibliography lists 623 reports, articles, and other documents introduced into the NASA scientific and technical information system between April 1 and June 30, 1983. Emphasis is placed on the use of remote sensing and geophysical instrumentation in spacecraft and aircraft to survey and inventory natural resources

and urban areas. Subject matter is grouped according to agriculture and forestry, environmental changes and cultural resources, geodesy and cartography, geology and mineral resources, hydrology and water management, data processing and distribution systems, instrumentation and sensors, and economic analysis.
A.R.H.

N83-31065 Bayerische Akademie der Wissenschaften, Munich (West Germany). Deutsche Geodaetische Commission.
SPECIAL RESEARCH PROGRAM 78 SATELLITE GEODESY OF THE TECHNICAL UNIVERSITY OF MUNICH: FOLLOW-UP REPORTS OF THE PARTIAL PROJECTS Final Report
Manfred Schneider 1982 199 p refs In GERMAN Sponsored Tech. Univ., Munich
(Ser-B-261; ISBN-3-7696-8556-3; ISSN-0065-5317) Copyright. Avail: Issuing Activity

Photographic and interferometric measurements, and astronomical-geodetic measurements are presented. Doppler measurement campaign results are discussed. Models and methods for the use of measurement results in satellite geodesy are considered. Figure and field parameter determination is treated.
Author (ESA)

N83-31066 Bayerische Akademie der Wissenschaften, Munich (West Germany). Deutsche Geodaetische Kommission.
INVESTIGATIONS OF GEODETIC GRIDS IN ICELAND FOR THE ANALYSIS OF DEFORMATIONS FROM 1965 TO 1977 Ph.D. Thesis - Tech. Univ. Brunswick [UNTERSUCHUNGEN GEODAETISCHER NETZE IN ISLAND ZUR ANALYSE VON DEFORMATION VON 1965 BIS 1977]
Bernhard Ritter 1982 195 p refs In GERMAN
(Ser-C-271; ISBN-3-7696-9323-X; ISSN-0065-5325) Copyright. Avail: Issuing Activity

The improvement of accuracy and reliability of geodetic grids for Earth crust movements was investigated using stochastic models. Results are plausible coordinates of the object points to be compared and an accuracy-describing covariance matrix for each measuring period and for each investigated region, enabling deformation analyses for the different periods to be carried out. Object point fields in the trigonometric main grids have distances between the points from 5 to 20 km; deformation figure have maximum size = 2 km X 5 km. Author (ESA)

N83-31067*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MONITORING THE DEFOLIATION OF HARDWOOD FORESTS IN PENNSYLVANIA USING LANDSAT Final Report
C. L. Dottavio, R. F. Nelson, and D. L. Williams, Principal Investigators Mar. 1983 104 p refs Original contains color imagery. Original photography may be purchased at the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(E83-10367; NASA-TM-85362; NAS 1.15:85362) Avail: NTIS HC A06/MF A01 CSCL 02F

An automated system for conducting annual gypsy moth defoliation surveys using LANDSAT MSS data and digital processing techniques is described. A two-step preprocessing procedure was developed that uses multitemporal data sets representing forest canopy conditions before and after defoliation to create a digital image in which all nonforest cover types are eliminated or masked out of a LANDSAT image that exhibits insect defoliation. A temporal window for defoliation assessment was identified and a statewide data base was established. A data management system to interface image analysis software with the statewide data base was developed and a cost benefit analysis of this operational system was conducted. A.R.H.

N83-31068# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
EVALUATION OF CORN (ZEA MAYS L.) WATER CONDITION: A THERMAL INFRARED REMOTE SENSING APPROACH [AVALIACAO DA CONDICAO HIDRICA DA CULTURA DO MILHO (ZEA MAYS L.): ABORDAGEM ATRAVES DE SENSORIAMENTO REMOTO TERMAL]
Jose Carlos Neves Epiphanio Apr. 1983 32 p refs In PORTUGUESE; ENGLISH summary Submitted for publication
(INPE-2718-PRE/304) Avail: NTIS HC A03/MF A01

A methodology that uses remote sensing data in the thermal infrared spectral band (8-14 microns) to detect water stress in corn (Zea mays L.) is presented. Using hourly canopy radiant temperature measured with a PRT-5 radiometer and air temperature during a drop reproductive period, an index that can be used to show the different water conditions at each experiment plot was derived. This index is correlated with corn yield, and a discussion about the better time of data recording was made. The results showed that the methodology used is efficient for all the proposed objectives. Author

N83-31069# Bureau of Mineral Resources, Geology and Geophysics, Canberra (Australia).
LAWN HILL REGION, QUEENSLAND
I. P. Sweet and L. J. Hutton (Geological Survey of Queensland) 1982 62 p refs Original document contains color illustrations
(ISBN-0-644-01909-3) Avail: NTIS HC A03/MF A01

The Lawn Hill Region was investigated to re-examine the Proterozoic rocks of northwestern Queensland. The project, started in 1969, aims to document in detail the geology of the Proterozoic rocks as an aid to mineral exploration and resource assessment. Production of geologic maps at a scale of 1:100 is an integral part of the project. Author

N83-31070# Bureau of Mineral Resources, Geology and Geophysics, Canberra (Australia).
DUCHESS REGION, QUEENSLAND
R. J. Bultitude (Geological Survey of Queensland), D. H. Blake, P. J. T. Donchak (Geological Survey of Queensland), and C. M. Mock 1982 51 p refs Original document contains color illustrations
(ISBN-0-644-01911-5) Avail: NTIS HC A04/MF A01

Proterozoic stratigraphy, Proterozoic intrusive rocks, late Adelaideau-Cambrian stratigraphy, Cainozoic, structure, metamorphism, mineral deposits, and geological history are summarized for the Duchess region of Queensland. Author

N83-31071# Bureau of Mineral Resources, Geology and Geophysics, Canberra (Australia).
NAPPERBY, NORTHERN TERRITORY: SHEET SF/53-9 INTERNATIONAL INDEX
A. J. Stewart, comp. 1982 54 p refs Original document contains color illustrations
Avail: NTIS HC A04/MF A01

The Napperby 1:250,000 Sheet area is situated in the south of the Northern Territory, between 22 deg 00mn and 23 deg 00mn S, and 132 deg 00mn and 133 deg 30mn E. The area is occupied by several pastoral leases (Mount Denison, Coniston, Tea Tree, Mount Allan, Napperby, Pine Hill, Mount Wedge, Derwent, and Aileron), where beef cattle are raised. Author

N83-31072# Bureau of Mineral Resources, Geology and Geophysics, Canberra (Australia).
BMR 82: YEARBOOK OF THE BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS, CONTAINING A SUMMARY OF ACTIVITIES, AND ARTICLES ON SOME OF THE WORK OF BMR IN 1982
1983 66 p
Avail: NTIS HC A04/MF A01

Sedimentary basins and sedimentary systems which have continental development and which may be host to fossil fuels or mineral deposits; basic geochemical, petrological, and geochronological research of major rock suites, of the environments of metalliferous deposits, and of the deposits themselves; the structure and characteristics of the crust and upper mantle relevant to the understanding of the evolution of the Australian continent; and the geology of offshore regions are discussed. Author

N83-31073# Bureau of Mineral Resources, Geology and Geophysics, Canberra (Australia). Dept. of National Development and Energy.

ARDMORE, QUEENSLAND
R. J. Bultitude (Geological Survey of Queensland, Australia) 1982 45 p refs Original contains color illustrations
(ISSN-0727-1409; ISBN-0-64401907-7) Avail: NTIS HC A03/MF A01

Early proterozoic to Carpentanian stratigraphy, proterozoic intrusive rocks, phanerozoic stratigraphy, structure, metamorphism, mineral resources, and a summary of geological history are provided. Author

N83-31074# Bureau of Mineral Resources, Geology and Geophysics, Canberra (Australia).
NABARLEK REGION, NORTHERN TERRITORY. GEOLOGICAL MAP COMMENTARY
R. S. Needham 1982 55 p refs Original contains color illustrations
(ISBN-0-644-01905-0) Avail: NTIS HC A04/MF A01

The area between latitude 12 deg and 12 deg 45 min S and longitudes 133 deg and 144 deg 30 min E, centered 265 km east of Darwin is covered. Stratigraphy, metamorphism, metasomatism, structure economic geology, and geological history are examined. Author

N83-31075# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
THERMAL REMOTE SENSING FOR EVALUATION OF PRODUCTIVITY AND WATER DEFICIENCY IN MAIZE IN THE CERRADO REGION M.S. Thesis [SENSORIAMENTO REMOTO TERMAL PARA AVALIACAO DE PRODUTIVIDADE E DEFICIENCIA HIDRICA DE MILHO (ZEA MAYS L.0) NA REGIAO DOS CERRADOS]
Jose Carlos Neves Epiphanio Apr. 1983 116 p refs In PORTUGUESE; ENGLISH summary
(INPE-2704-TDL/129) Avail: NTIS HC A06/MF A01

Remote sensing data in thermal infrared spectral band (8 - 14 micrometers) were used to evaluate corn (Zea mays L.) yield when it was submitted to water stress. Also it was sought to establish an index of water stress during the growth period, an evaluation of more efficient hour for data recording, a comparison between results obtained by using field and station meteorological data, and a qualitative analysis of the influence of some meteorological parameters on the canopy radiant temperature measured with a PRT-5 radiometer. To achieve these objectives a field experiment was conducted on Centro de Pesquisa Agropecuaria dos Cerrados, Brasiiia - DF, where corn plots were submitted to different water stress treatments during a crop reproductive period. Using canopy radiant temperature measured with a PRT-5 radiometer and air temperature, an index was derived that could be used as an indicator of water stress at each experiment plot, and this index was related to crop yield. It was concluded that utilization of data from meteorological station did not influence the results. B.W.

N83-31076# Corps of Engineers, Omaha, Nebr.
SIX-STATE HIGH PLAINS OGALLALA AQUIFER REGIONAL RESOURCES STUDY: APPENDIXES A, B, C, D, & E
Sep. 1982 410 p
(AD-A126196) Avail: NTIS HC A18/MF A01 CSCL 13/2

The results of the Omaha District Corps of Engineers' study of water transfer for the Six-State High Plains - Ogallala Aquifer Regional Resources Study, (High Plains Study) are reported. This report serves as both an engineering report and an environmental assessment. GRA

N83-31077# Corps of Engineers, Omaha, Nebr.
SIX-STATE HIGH PLAINS OGALLALA AQUIFER REGIONAL RESOURCES STUDY
Sep. 1982 112 p
(AD-A126195) Avail: NTIS HC A06/MF A01 CSCL 13/2

The water transfer of the six state high plains and its resources was studied. The region encompassed by the six-state High Plains-Ogallala Aquifer Regional Resources Study comprises some 180 counties, an area of about 225,000 square miles, wholly or partly overlying the Ogallala Aquifer which is the principal source of water supply for irrigation and other uses. The Aquifer extends from the High Plains area of West Texas and eastern New Mexico, northward through the panhandle area of Oklahoma, western Kansas and eastern Colorado, and the central and western parts of Nebraska. GRA

N83-31078# Data Information Associates, Albuquerque, N. Mex.
STATISTICAL TECHNIQUES APPLIED TO AERIAL RADIOMETRIC SURVEYS (STAARS): TIME SERIES ANALYSIS OF AIRBORNE RADIOMETRIC DATA. NATIONAL URANIUM RESOURCE EVALUATION
H. T. Davis Sep. 1982 62 p refs
(Contracts W-7405-eng-36; DE-AC13-76GJ-01664)
(DE83-000782; GJBX-215-18) Avail: NTIS HC A04/MF A01

Airborne radiometric surveys over parts of the United States were conducted to assist in the location of potentially profitable mineral deposits. Techniques useful in the analysis of these survey data are presented. The concept of linearity certain point processes is outlined. The concept of filtering a point process together with the model for the process can then be used to derive the matched filter to optimally extract the ground level concentration information from the airborne data. The use of the airborne data to enhance design of ground based experiments and measurements is discussed and concepts of multivariate time series are developed to show how several energy bands can be optimally used to estimate the concentration of a single isotope using time series regression methods. Time series principal components are used to gain better signal to noise properties than are typically obtained with the use traditional principal components. DOE

N83-31079# Sandia Labs., Albuquerque, N. Mex. Test Planning and Diagnostics Div.
WATER SOURCES IN SOUTHEAST NEW MEXICO (SENM) ROCK SALT
Jacque J. Hohlfelder and Wayne M. McMurtry Mar. 1983 17 p refs
(Contract DE-AC04-76DP-00789)
(DE83-010129; SAND-83-0530) Avail: NTIS HC A02/MF A01

The two principal components of water in southeast New Mexico rock salt were determined. The water in this material, due to fluid inclusions, is shown to be 0.30 + or - 0.03%. The total water content of this material, 0.65 + or - 0.05%, is consistent with earlier measurements of similar material. DOE

N83-31080# California Univ., Berkeley. Lawrence Berkeley Lab. Earth Sciences Div.
RESISTIVITY MONITORING OF FLUID MIGRATION AT THE CERRO PRIETO GEOTHERMAL FIELD
N. E. Goldstein, K. Pruess, M. J. Wilt, and G. Bodvarsson 1982 13 p refs Presented at the 8th Workshop on Geothermal Reservoir Eng., Stanford, Calif., 14-16 Dec. 1982
(Contract DE-AC03-76SF-00098)
(DE83-009372; LBL-14979; CONF-821214-7) Avail: NTIS HC A02/MF A01

Apparent resistivities, measured by repetitive, dipole/dipole dc resistivity surveys show significant and somewhat systematic changes over the area of the Cerro Prieto (-) reservoir. These changes are attributed to temperature and salinity changes, consequences of production, and natural recharge. Reservoir simulation studies combined with the appropriate dc resistivity calculations were performed to determine the magnitude and form of resistivity change. We considered production from a liquid dominated reservoir with dimensions and parameters of the Cerro Prieto (-) reservoir and assumed lateral and vertical recharge of colder, less saline waters. The associated apparent resistivities increase 10 to 20% over the production area during a 3 year period at the current rate of production. It is concluded that if properly conducted, dc resistivity monitoring appears capable of providing indirect information on fluid flow processes, including reinjection in a producing reservoir. DOE

N83-31081# Bendix Field Engineering Corp., Grand Junction, Colo.
DATA RELEASE ON THE SALTON SEA QUADRANGLE,

CALIFORNIA AND ARIZONA
Randall T. Chew, III and Donald R. Antrim Oct. 1982 44 p refs (Contract DE-AC13-76GJ-01664)
(DE83-007104; GJBX-190-82) Avail: NTIS HC A03/MF A01

The purpose of the National Uranium Resource Evaluation (NURE) was to delineate and evaluate all geologic environments favorable for the occurrence of uranium deposits. A favorable environment was defined as having the potential to contain an occurrence of at least 100 tons of U3O8 at an average grade of not less than 0.01% U3O8. In the Salton Sea Quadrangle, reported uranium occurrences were evaluated, and geologic environments thought to be favorable were examined. The field data collected during that work is given as well as a summary of the quadrangle geology and uranium favorability. DOE

N83-31082# Michigan Univ., Ann Arbor. Dept. of Geological Sciences.
GEOPHYSICAL INVESTIGATIONS OF THE WESTERN OHIO-INDIANA REGION Annual Report, Oct. 1981 - Sep. 1982
D. H. Christensen, M. G. Wiedenbeck, and P. L. Jackson Feb. 1983 116 p refs
(DE83-901400; NUREG/CR-3145-Vol-1) Avail: NTIS HC A06/MF A01; SOD HC $5.50

Earthquake activity in the Western Ohio-Indiana region is monitored with a precision seismograph network consisting of nine stations clustered about Anna, Ohio, and four stations in Indiana centered about Indianapolis. During this period of October 1981 to September 1982, no earthquakes were detected in the region of the network. This seismic inactivity contrasts with the previous year, during which nine small (unfelt) earthquakes occurred within and adjacent to the Western Ohio portion of the network. Digital triggering and recording capability was added to the analog recording capability. Using the new digital capability, it was possible to more precisely locate the focus of some of these small earthquakes. As part of the inception of a modeling investigation, a preliminary location of the Grenville Front was postulated as eastward of the network. Azimuthal changes in travel time residuals of teleseisms were used for this estimate. DOE

N83-31083# Department of Energy, Laramie, Wyo.
DEPOSITIONAL ENVIRONMENTS, SUBSURFACE STRATIGRAPHY AND POST-BURN CHARACTERIZATION OF THE PALEOCENE-EOCENE HANNA FORMATION AT THE HANNA, WYOMING UNDERGROUND COAL-GASIFICATION SITE: HANNA 2, PHASE 1 EXPERIMENT
Alv D. Youngberg, James E. McClurg (Wyoming Univ., Laramie), and James G. Schmitt (Nevada Univ., Las Vegas) Feb. 1983 166 p refs
(DE83-005592; DOE/LC/RI-83/2) Avail: NTIS HC A08/MF A01

During the summer of 1981, the Laramie Energy Technology Center conducted a post-burn coring program at the Hanna 2, Phase 1, Underground Coal Gasification site, Hanna, Wyoming. Detailed geologic studies were conducted on the altered and unaltered overburden as well as an analysis of the burn cavity. The overburden consists of about 80 meters of Paleocene-Eocene Hanna formation above the Hanna No. 1 coal bed used in the burn. The overburden contains three basic lithologic units: Unit A consists of very fine-grained sandstones, siltstones, and claystones deposited as a lacustrine delta. Unit A is immediately above the Hanna No. 1 coal. Unit B is above Unit A and consists of carbonaceous shales and mudstones containing isolated lenticular and tabular sandstone bodies deposited in a meandering fluvial system. Unit C is above Unit B and contains coarse-grained sandstones and conglomerates deposited in a braided river system. DOE

N83-31084# Sandia Labs., Albuquerque, N. Mex. Geotechnology Research Div.
MINERALOGY AND PETROLOGY ASPECTS OF THE MESAVERDE FORMATION AT RIFLE GAP, COLORADO, SPECIFIC TO THE SEDIMENTOLOGY AND GAS-BEARING INTERVALS IN THE SUBSURFACE
David M. Heinze Mar. 1983 39 p refs
(Contract DE-AC04-76DP-00789)
(DE83-009473; SAND-83-0287) Avail: NTIS HC A03/MF A01

Rifle Gap, situated on the eastern edge of the Piceance Creek Basin, northwestern Colorado, was the focus of sedimentological studies in an effort to understand the tight, gas-bearing intervals of the inner-basin subsurface. These Mesaverde Formation sandstone exposures were sampled and analyzed for mineral content and grain morphology. Varying detrital mineralogy supports a sedimentological model for the area which includes shoreline blanket, paludal, fluvial, and marine zones (from bottom to top). Observable mineralogical determinants for the depositional groups include chert, organic and feldspar content, sorting, and grain size. Statistical methods were successful in distinguishing groups in the data which correspond nicely to the model's environments of deposition. Analcime, feldspar, clay, rock fragments, and organics are significant variables in group separation. Time, stability, rock matrix relationships, and grain morphology are proposed as explanatory elements for correlations of variables. Author

N83-31085# Clarkson Coll. of Technology, Potsdam, N.Y. Dept. of Civil and Environmental Engineering.
WINTER FLOW, ICE AND WEATHER CONDITIONS OF THE UPPER ST. LAWRENCE RIVER, 1971-81. VOLUME 1: ICE COVER CHARTS (PART A)
Hung Tao Shen, Gary C. Pasquarell, and Roger W. Ruggles Jun. 1982 256 p Sponsored in part by N.Y. Sea Grant Inst. 4 Vol. (Grant NA80RA-C-00147)
(PB83-166256; NOAA-83012507) Avail: NTIS HC A12/MF A01 CSCL 08L

Water flow and ice data on the international section of the St. Lawrence River are given. The International Section of the St. Lawrence River between Kingston and the Moses-Saunders Power Dam near Massena is the outlet of the Great Lakes. This river is being utilized for hydro-power production and serves as the only navigation passage for shipping between the Atlantic Ocean and the Great Lakes. The river flow is regulated by the Power Dam, which is part of the St. Lawrence Project completed in 1959 as a joint venture of the United States and Canada. Planning for the winter flow regulation is closely related to the ice conditions in the river, which effect both the amount of power generated and the length of navigation season. Author (GRA)

N83-31086# Clarkson Coll. of Technology, Potsdam, N.Y. Dept. of Civil and Environmental Engineering.
WINTER FLOW, ICE AND WEATHER CONDITIONS OF THE UPPER ST. LAWRENCE RIVER, 1971-81. VOLUME 1: ICE COVER CHARTS (PART B)
Hung Tao Shen, Gary C. Pasquarell, and Roger W. Ruggles Jul. 1982 265 p Sponsored in part by N.Y. Sea Grant Inst. 4 Vol. (Grant NA80RA-C-00147)
(PB83-166264; NOAA-83012508) Avail: NTIS HC A12/MF A01 CSCL 08L

Flow and ice data on the international section of the St. Lawrence River are given. The International Section of the St. Lawrence River between Kingston and the Moses-Saunders Power Dam near Massena is the outlet of the Great Lakes. This river is being utilized for hydro-power production and serves as the only navigation passage for shipping between the Atlantic Ocean and the Great Lakes. Planning for the winter flow regulation is closely related to the ice conditions in the river, which effect both the amount of power generated and the length of navigation season. Author (GRA)

N83-31087# Clarkson Coll. of Technology, Potsdam, N.Y. Dept. of Civil and Environmental Engineering.
WINTER FLOW, ICE AND WEATHER CONDITIONS OF THE UPPER ST. LAWRENCE RIVER, 1971-81. VOLUME 2: ICE COVER THICKNESS
Hung Tao Shen and Poojitha N. D. D. Yapa Jul. 1982 119 p refs Sponsored in part by N.Y. Sea Grant Inst. 4 Vol. (Grant NA80RA-C-00147)
(PB83-166272; NOAA-83013103) Avail: NTIS HC A06/MF A01 CSCL 08L

Ice thickness data on The International Section of the St. Lawrence River between Kingston and the Moses-Saunders Power Dam near Massena is the outlet of the Great Lakes are given. This river is being utilized for hydro-power production and serves as the only navigation passage for shipping between the Atlantic Ocean and the Great Lakes. Author (GRA)

N83-31088# Clarkson Coll. of Technology, Potsdam, N.Y. Dept. of Civil and Environmental Engineering.
WINTER FLOW, ICE AND WEATHER CONDITIONS OF THE UPPER ST. LAWRENCE RIVER, 1971-81. VOLUME 3: WATER LEVEL, DISCHARGE, AND TEMPERATURE
Hung Tao Shen and Poojitha N. D. D. Yapa Jul. 1982 190 p refs Sponsored in part by N.Y. Sea Grant Inst. 4 Vol.
(Grant NA80RA-C-00147)
(PB83-166280; NOAA-83012509) Avail: NTIS HC A05/MF A01 CSCL 08L

Water levels, discharge, and water temperatures are given for the international section of the St. Lawrence River. The International Section of the St. Lawrence River between Kingston and the Moses-Saunders Power Dam near Massena is the outlet of the Great Lakes. This river is being utilized for hydro-power production and serves as the only navigation passage for shipping between the Atlantic Ocean and the Great Lakes. GRA

N83-31089# Clarkson Coll. of Technology, Potsdam, N.Y. Dept. of Civil and Environmental Engineering.
WINTER FLOW, ICE AND WEATHER CONDITIONS OF THE UPPER ST. LAWRENCE RIVER, 1971-81. VOLUME 4: AIR TEMPERATURE AND PRECIPITATION
Hung Tao Shen and Poojitha N. D. D. Yapa Jul. 1982 199 p Sponsored in part by N.Y. Sea Grant Inst. 4 Vol.
(Grant NA80RA-C-00147)
(PB83-166298; NOAA-83012510) Avail: NTIS HC A09/MF A01 CSCL 08L

Water temperature and ice thickness data are given for the international section of the St. Lawrence River. The International Section of the St. Lawrence River between Kingston and the Moses-Saunders Power Dam near Massena is the outlet of the Great Lakes. This river is beng utilized for hydro-power production and serves as the only navigation passage for shipping between the Atlantic Ocean and the Great Lakes. GRA

N83-31090# Puerto Rico Univ., Mayaguez. Water Resources Research Inst.
REGIONAL ANALYSIS OF DROUGHTS IN SOUTH EASTERN PUERTO RICO Final Completion Report
Manuel F. Pedraja-Santos 1983 30 p refs
(Contract DI-14-34-0001-1141)
(PB83-178020; W83-02217; OWRT-A-069-PR(1)) Avail: NTIS HC A03/MF A01 CSCL 08H

The time-series of stream flows for the five major streams in the area under consideration are presented in the study. Among them, only Rio Grande de Patilla's data corresponds to actual measured flows. All the other stream-flows were calculated from the average annual precipitation in the basin area. The average annual precipitation on the basin area was calculated using Thiessens method. The long-term mean annual flow, the number of drought period of 'i' duration for each stream, the mean drought duration, mean failure probability and the 'i' year failure probability are shown in tables for each stream. GRA

N83-31091# Puerto Rico Univ., Mayaguez. Dept. of General Engineering.
EVALUATION OF THE REDUCTION OF THE VOLUME OF FLOW CARRIED BY CERTAIN RIVERS OF PUERTO RICO AND ITS POSSIBLE CORRELATION WITH CHANGES IN LAND USE, FROM 1508 TO PRESENT Final Completion Report
Luis Pumarada ONeill 1983 60 p refs
(Contract DI-14-34-0001-0141)
(PB83-178004; W83-02215; OWRT-A-063-PR(1)) Avail: NTIS HC A04/MF A01 CSCL 08H

Historical evidence and oral accounts seem to indicate that there has been a significant reduction in the flow of many rivers in Puerto Rico. Several possible causes for this phenomenon have been mentioned, including the well documented, slight, but significant decrease in the average rainfall since the 1930's, the diversion of flow for irrigation and human water consumption, and the changes in land use that have taken place in the island. After an analyses of part of the existing historical evidence, which is found to be inconclusive, this paper undertakes a statistical study of available data for certain rivers in Puerto Rico. Author (GRA)

N83-31092# Puerto Rico Univ., Mayaguez. Water Resources Research Inst.
APPLICATION OF QUANTITATIVE GEOMORPHIC ANALYSIS TO THE GEOGRAPHIC BASINS OF PUERTO RICO Final Completion Report
Nicolino Liberatore 1983 105 p refs
(Contract DI-14-34-0001-1141)
(PB83-177980; W83-02213; OWRT-A-060-PR(1)) Avail: NTIS HC A06/MF A01 CSCL 08H

This investigation was performed with the purpose of implementing in Puerto Rico the investigation of geomorphic factors that characterize drainage systems and to elucidate and interpret the relationship between geologic-structural conditions and the hydrologic characteristics. The area selected as the sample was the Tallaboa river basin, because of its peculiarity of the distribution of its surface rocks and because of the availability of hydrologic information for the area. In order to accomplish the investigation the hydrographic network obtained from aerial photographs was designed and systematically transferred to the topographic base represented by the U. S. Geological Survey (U.S.G.S.) maps at a scale of 1:20,000. GRA

N83-31093# Geological Survey, Sacramento, Calif.
WATER RESOURCES DATA FOR CALIFORNIA, WATER YEAR 1981. VOLUME 4: NORTHERN CENTRAL VALLEY BASINS AND THE GREAT BASIN FROM HONEY LAKE BASIN TO OREGON STATE LINE Annual Water-Data Report, 1 Oct. 1980 - 30 Sep. 1981
Sep. 1982 375 p 4 Vol.
(PB83-174490; USGS-WDR-CA-81-4; USGS/WRD/HD-82/004) Avail: NTIS HC A16/MF A01 CSCL 08H

Water-resources data for the 1981 water year for California consists of records of stage, discharge, and water quality of streams; stage and contents in lakes and reservoirs; and water levels and water quality in wells. The report contains discharge records for 167 gaging stations; stage and contents for 26 lakes and reservoirs; precipitation data for 2 stations; water quality for 17 stations; water levels for 55 observation wells, and water quality for 18 wells. GRA

N83-31094# Geological Survey, Sacramento, Calif. Water Resources Div.
WATER RESOURCES DATA FOR CALIFORNIA, WATER YEAR 1981. VOLUME 3: SOUTHERN CENTRAL VALLEY BASINS AND THE GREAT BASIN FROM WALKER RIVER TO TRUCKEE RIVER Annual Water-Data Report, 1 Oct. 1980 - 30 Sep. 1981
Sep. 1982 436 p 4 Vol.
(PB83-174482; USGS-WDR-CA-81-3; USGS/WRD/HD-81/0003) Avail: NTIS HC A19/MF A01 CSCL 08H

Water resources data for the 1981 water year for California consists of records of stage, discharge, gage-height, and water quality of streams; stage, contents and water quality of lakes and reservoirs; water levels and water quality of wells. The report contains discharge records for 158 gaging stations; stage and contents for 50 lakes and reservoirs; gage height records for 2 lakes; water quality for 23 stations; water levels for 53 observation wells, and water quality for 7 wells. Also included are 11 crest-stage partial-record stations and two water-quality partial-record stations. GRA

N83-31095# Geological Survey, Sacramento, Calif. Water Resources Div.
WATER RESOURCES DATA FOR CALIFORNIA, WATER YEAR

1981. VOLUME 2: PACIFIC SLOPE BASINS FROM ARROYO GRANDE TO OREGON STATE LINE EXCEPT CENTRAL VALLEY Annual Report, 1 Oct. 1980 - 30 Sep. 1981
Nov. 1982 529 p Sponsored in part by the California Dept. of Water Resources and other agencies
(PB83-174474; USGS-WDR-CA-81-2-Vol-2; USGS/WRD/HD-82/017-Vol-2) Avail: NTIS HC A23/MF A01 CSCL 08H

Water resources data in for the 1981 water year consists of records of stage, discharge, and water quality of streams and wells; stage, contents, and water quality in lakes and reservoirs; and water levels in wells. Discharge records for 162 gaging stations; stage and contents for 12 lakes and reservoirs; water quality for 63 stations and 27 wells; water levels for 78 observation wells are given. Also included are 1 low-flow partial-record station and 32 water quality partial-record stations. Author (GRA)

N83-31096# Geological Survey, Sacramento, Calif. Water Resources Div.
WATER RESOURCES DATA FOR CALIFORNIA, WATER YEAR 1981. VOLUME 1: COLORADO RIVER BASIN, SOUTHERN GREAT BASIN FROM MEXICAN BORDER TO MONO LAKE BASIN AND PACIFIC LOPE BASINS FROM TIJUANA RIVER TO SANTA MARIA RIVER Annual Report, 1 Oct. 1980 - 30 Sep. 1981
Aug. 1982 434 p Sponsored in part by the California Dept. of Water Resources and other agencies
(PB83-174466; USGS-WDR-CA-81-1-Vol-1; USGS/WRD/HD-82/063-Vol-1) Avail: NTIS HC A19/MF A01 CSCL 08H

Water-resources data for the 1981 water year for California consists of records of stage, discharge, and water quality of streams; stage and contents in lakes and reservoirs; and water levels and water quality in wells. Discharge records for 169 gaging stations; stage and contents for 19 lakes and reservoirs; water quality for 42 streams and 21 wells; water levels for 169 observation wells are given. Also included are 10 crest-stage partial-record stations. Author (GRA)

N83-31097# North Central Forest Experiment Station, St. Paul, Minn.
TIMBER VOLUMES IN MICHIGAN, 1980 Final Report
Arnold J. Ostrom Mar. 1983 8 p
(PB83-169037; FSRN-NC-290) Avail: NTIS HC A02/MF A01 CSCL 02F

The fourth inventory of Michigan's forest resources shows a 27% increase in growing stock volume between 1966 and 1980 (15 to 19 billion cubic feet). Varieties of trees are identified and their volumes noted. The number of boardfeet of lumber is estimated. Author (GRA)

N83-31098# National Oceanic and Atmospheric Administration, Rockville, Md. Tides and Water Levels Branch.
SEA LEVEL VARIATIONS FOR THE US: 1855-1980
Steacy D. Hicks, Henry A. Debaugh, Jr., and Leonard E. Hickman, Jr. Jan. 1983 178 p refs
(PB83-175943; NOAA-83030301) Avail: NTIS HC A09/MF A01 CSCL 08E

An introduction to the study of sea level and its applications are presented. Trends, their standard errors, and annual variabilities are computed for 44 U.S. stations that are permanent, continuous, and were in operation before 1940. The computations are for the entire length of series at each station and for the common series length, 1940 through 1980. Trends, their standard errors, and annual variabilities also are computed for five area means and the U.S. mean. Graphs of area means, the U.S. mean, and 67 individual stations are depicted, the latter for both yearly and monthly mean sea level. Monthly and yearly mean sea level data are tabulated for the entire length of series at the 67 stations. Author (GRA)

N83-31099# Georgia Univ., Athens. Dept. of Geography.
PREDICTING THE SPECIFIC CAPACITIES OF WELLS PENETRATING THE OCALA AQUIFER BENEATH THE DOUGHERTY PLAIN, SOUTHWEST GEORGIA
George A. Brook and Chin-hong Sun Sep. 1982 99 p refs Prepared in cooperation with Georgia Inst. of Tech., Atlanta
(Contract DI-14-34-0001-0111)
(PB83-167965; ERC-09-82; W83-02066; OWRT-A-086-GA(1)) Avail: NTIS HC A05/MF A01 CSCL 08H

Within the Dougherty Plain region of Georgia, well specific capabilities in gpm/ft are significantly higher when wells are located within a zone extending for 97 feet on either side of a fracture trace. The mean specific capacity of 18 fracture trace wells examined was 435 gpm/ft; the mean of 21 nonfracture trace wells was 85 gpm/ft. The model recommended for use in predicting fracture trace well specific capacity is given in the report. Author (GRA)

N83-31100# Texas A&M Univ., College Station. Dept. of Civil Engineering.
DOCUMENTATION OF SED-A SEDIMENT-WATER COLUMN CONTAMINANT MODEL
Gregory A. Lang and Steven C. Chapra Aug. 1982 57 p refs
(PB83-169946; GLERL-41; NOAA-83022310) Avail: NTIS HC A04/MF A01 CSCL 08H

Presented is documentation of a mathematical model developed to simulate the contaminant level in the sediments and overlying water column of a well mixed lake. The contaminant is segmented into three fractions, organic, inorganic, and dissolved, each with different physical and kinetic properties. The principal application of the model would be prediction of the year to year and steady state response of the water column and sediments to changes in the loading rate of contaminant and/or particulate matter. GRA

N83-31101# Nevada Univ. System, Reno. Water Resources Center.
ARTIFICIAL RECHARGE OF SURFACE RUNOFF IN COLD SPRING VALLEY, NEVADA
John E. Dowden, Michael E. Campana, Stephen W. Wheatcraft, and Roger L. Jacobson Dec. 1982 60 p refs
(Contract DI-14-34-0001-9082)
(PB83-173229; PUB-41071; W83-02131; OWRT-B-109-NEV(1)) Avail: NTIS HC A04/MF A01 CSCL 08H

Cold Spring Valley, Nevada was examined with the intent of developing a methodology for studying and implementing artificial recharge - surface runoff harvesting schemes that could be employed in other basins of Nevada. A steady-state, finite element model was used to simulate the Cold Spring Valley ground water flow system. The primary limiting factor to any artificial recharge scenario in Cold Spring Valley is the response of the water table in the Reno Park subdivision caused by an increase in the septic field load. The existing groundwater and waste management practices mitigate against the implementation of artificial recharge in the valley at this time. However, with increasing growth in the valley, artificial recharge will undoubtedly become viable in the future. Author (GRA)

N83-31102# Kansas State Univ., Manhattan.
ORGANIC MATTER LOADING AND PROCESSING IN A PRISTINE STREAM DRAINING A TALLGRASS PRAIRIE-RIPARIAN FOREST WATERSHED Project Completion Report, 1 Oct. 1979 - 30 Sep. 1982
Martin E. Gurtz, G. Richard Marzolf, Keith T. Kinningbeck, David L. Smith, and J. Vaun McArthur Nov. 1982 88 p refs Sponsored in part by the Bureau of Reclamation, Washington
(Contract DI-14-34-0001-0264)
(PB83-173245; CONTRIB-230; W83-02133; OWRT-B-063-KAN(1)) Avail: NTIS HC A05/MF A01 CSCL 08H

The stream chosen for study lies within the Kings Creek watershed of Konza Prairie Research Natural Area, a tallgrass prairie site near Manhattan, Kansas. The primary purpose in this organic matter investigation was to provide an observational basis for future research relating to water quality. Secondly, there was need to evaluate present understanding of stream ecosystems.

Organic matter contributions to the stream were estimated for one year. GRA

N83-31103# New Mexico Inst. of Mining and Technology, Socorro.
RECHARGE IN SEMIARID MOUNTAIN ENVIRONMENTS
Gerardo Wolfgang Gross Jun. 1982 45 p refs
(Contract DI-14-34-0001-9123)
(PB83-173286; W83-02137; OWRT-B-059-NMEX(3)) Avail: NTIS HC A03/MF A01 CSCL 08H

Tritium activity in precipitation, surface water, springs, and ground water of the Roswell artesian basin in New Mexico was investigated. It was supplemented by hydrogeologic reconnaissance of spring systems; by various statistical correlations and spectral analysis of stream flow and water level records of observation wells; spring discharge measurements; stable isotope determinations; and by numerical modeling of part of the basin. Two recharge contributions to the Principal or Carbonate Aquifer are distinguished principally on the basis of their tritium label and aquifer response characteristics. Almost all basin waters fall close to the meteoric line of hydrogen/oxygen isotope composition, which rules out a juvenile origin or appreciable bedrock interaction. GRA

N83-31104# New Mexico Inst. of Mining and Technology, Socorro.
BASELINE STUDY OF OXYGEN 18 AND DEUTERIUM IN THE ROSWELL, NEW MEXICO GROUNDWATER BASIN
Roberta N. Hoy and Gerardo Wolfgang Gross May 1982 107 p refs
(Contract DI-14-34-0001-9123)
(PB83-173302; WRRI-144; W83-02139; OWRT-B-059-NMEX(2)) Avail: NTIS HC A06/MF A01 CSCL 08H

The isotopic ratios of deuterium and oxygen 18 were measured in precipitation, surface, and ground water samples from the Roswell Artesian ground water asin in south-central New Mexico. The narrow range of D and 180 indicates mixing effects which are ascribed to one or more of the following factors: long ground water flow paths; large temperature fluctuations affecting which overwhelm the influence of elevation on precipitation; two sources of atmospheric moisture; interaquifer leakage; and recharge from intermittent streams with the flow-length expanding and contraction over large distances. It is concluded that a more precise definition of circulation patterns on the basis of stable isotope differences will require a much greater sampling frequency in both space and time. GRA

N83-31105# Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
EVALUATION OF DROUGHT POTENTIALS AND DAMAGES IN THE NORTHEASTERN US Final Report
Gert Aron and Gary B. Emmanuel Sep. 1982 172 p refs
(Contract DI-14-34-0001-1261)
(PB83-173328; W83-02141; OWRT-B-124-PA(1)) Avail: NTIS HC A09/MF A01 CSCL 08H

Drought is an infrequent hydrologic event in the northeastern United States in which the availability of water for a variety of uses becomes restricted. It is defined in terms of the various uses for streamflow and the sum of the minimum low flow requirements for each. Regression equations were developed for selected low flow rates using data from streamflow gaging stations in Pennsylvania of the damages incurred by Pennsylvania water suppliers during the 1980-81 drought were examined Augmentation of streamflow by groundwater recharge is discussed. It was examined that the diurnal fluctuations of dissolve oxygen increased substantially when discharge rates drop below normal dry weather flows. GRA

N83-31106# Purdue Univ., Lafayette, Ind. Water Resources Research Center.
CLUSTER MODEL FOR FLOOD PEAK ANALYSIS: APPLICATION TO LOWER OHIO RIVER BASIN Technical Report, Oct. 1979 - Sep. 1982
J. E. Cervantes, M. L. Kavvas, and J. W. Delleur Dec. 1982 183 p refs
(Contract DI-14-34-0001-0219)
(PB83-173344; W83-02143; OWRT-B-112-IND(2); PU-TR-145) Avail: NTIS HC A09/MF A01 CSCL 08H

A statistical model for the times of occurrence and the magnitudes of flood peaks is developed. The model is based on a two-level and two-dimensional nonhomogeneous point stochastic process. The two levels correspond to the rainfall clusters and the flood clusters. The two dimensions are the times of occurrence (of the rainfall clusters or of the flood peaks) and the magnitudes (of the rainfall volumes or of the peak discharges). The statistical properties of the total number of flood peaks are developed in terms of the probability generating functional of the stochastic process. Author (GRA)

N83-30459# Joint Publications Research Service, Arlington, Va.
FRAGMENT SPACE SYSTEM FOR NATURAL RESOURCE STUDY
G. A. Avanesov and Ya. L. Ziman *In its* USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 55-63 Transl. into ENGLISH from Zemlya i Vselennaya (Moscow), no. 4, Jul. - Aug. 1982 p 6-12 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

N83-30470# Indian Space Research Organization, Bangalore.
A ROHINI 150 kg REMOTE SENSING MISSION
U. R. Rao, M. G. Chandrasekhar, and K. Kasturirangan *In* DFVLR DFVLR/ISRO Colloq. About a Decade of Cooperation in the Field of Space Res. and Technol. Jan. 1983 p 67-88 (For primary document see N83-30463 19-12)
Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 35,20

N83-30472# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
REMARKS ON DFVLR RESEARCH ACTIVITIES ESPECIALLY CONCERNING MULTISPECTRAL ELECTRO-OPTICAL STEREO SCANNER (MEOSS) AND AUTOMATIC PAYLOAD CONTROL (APC) WITH RESPECT TO OTHER EXPERIMENTS
H. Haeberle *In its* DFVLR/ISRO Colloq. About a Decade of Cooperation in the Field of Space Res. and Technol. Jan. 1983 p 99-102 (For primary document see N83-30466 19-12)
Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 35,20

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N83-31107*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DOE LARGE HORIZONTAL AXIS WIND TURBINE DEVELOPMENT AT NASA LEWIS RESEARCH CENTER
B. S. Linscott [1982] 16 p refs Presented at the Wind/Solar Energy Conf., Kansas City, Mo., 25-26 Apr. 1983
(NASA-TM-83444; E-1744; DOE/NASA-20320-47; NAS 1.15:83444) Avail: NTIS HC A02/MF A01 CSCL 10A

Large wind turbine activities managed by NASA Lewis are reviewed. These activities include results from the first and second generation field machines (Mod-OA, -1, and -2), the status of the Department of Interior WTS-4 machine for which NASA is responsible for technical management, and the design phase of the third generation wind turbines (Mod-5). Author

N83-31108# GKSS-Forschungszentrum Geesthacht (West Germany). Zentralabteilung Technikum.
COMPARATIVE INVESTIGATION OF THE PERFORMANCES OF

10 kW POWER TYPE WIND ENERGY PLANTS [VERGLEICHENDE UNTERSUCHUNGEN DES BETRIEBSVERHALTENS VON WINDENENERGIEANLAGEN DER LEISTUNGSKLASS 10 kW]
S. Fries, J. Bruegmann, G. Petersen, and H.-T. Mengelkamp 1982 42 p refs In GERMAN; ENGLISH summary
(GKSS-82-E-48; ISSN-0344-9629) Avail: NTIS HC A03/MF A01

A test field for wind energy converters, its technical equipment, and nine different wind energy converters are described. Operating experience and results of the first 2 years of operation of the Aeroman and the Windmatic plants are summarized. Performances vary between 0.42 kW and 23.01 kW (Windmatic) and 1.59 kW to 11.07kW (Man) for average wind velocities 5.5 m/sec to 15.5 m/sec. Author (ESA)

N83-31109# National Bureau of Standards, Washington, D.C.
WEATHERING PERFORMANCE OF COVER MATERIALS FOR FLAT PLATE SOLAR COLLECTORS Final Technical Note
Elizabeth J. Clark and Willard E. Roberts Nov. 1982 84 p refs Sponsored in part by DOE
(PB83-164988; NBS-TN-1170) Avail: NTIS HC A05/MF A01 CSCL 10A

Weathering studies were performed to obtain data on the performance and durability of cover plate materials for flat plate solar collectors used in solar heating and cooling systems. Ten materials were evaluated to assess their durability after natural weathering and artificial weathering with a xenon arc light. The materials were weathered for four years on small mini-collectors in Arizona, Florida, and Maryland after which the solar energy transmittance and the effect of dirt on the transmittance were measured. The tensile properties of selected film materials were also assessed after weathering. The effects of the natural weathering are compared for materials exposed as inner and outer cover plates for each weathering site, for the three weathering sites, and with materials artificially weathered with a xenon arc light. Author (GRA)

N83-31110# Battelle Pacific Northwest Labs., Richland, Wash.
PRELIMINARY ASSESSMENT OF THE USE OF HEAT TRANSFER FLUIDS FOR SOLAR THERMAL ENERGY SYSTEMS Final Report, May 1981 - Apr. 1982
Stephen E. Petty, Bobi A. Garrett-Price, and Gary L. McKown Feb. 1983 75 p refs
(PB83-170597; PNL-4182; EPA-600/7-83-021) Avail: NTIS HC A04/MF A01 CSCL 10A

A preliminary assessment, based on available data, on the extent to which various materials will be used as heat transfer media in solar energy systems and of mechanisms for their release to the environment is given. The emphasis is on solar thermal energy systems for industrial, agricultural and electrical production applications over the next 5-10 years. An assessment is given of consequences associated with transport and fate of the materials in the environment. Available pollution control techniques are identified and areas where further research may be required are cited. GRA

N83-31111# United Technologies Corp., South Windsor, Conn. Power Systems Div.
ON-SITE CELL FIELD TEST SUPPORT PROGRAM Annual Report, Jul. 1981 - Jun. 1982
J. W. Staniunas and G. P. Merten Sep. 1982 107 p refs Sponsored by Gas Research Inst.
(PB83-188672; FCR-4685; GRI-82/0046) Avail: NTIS HC A06/MF A01 CSCL 10B

Utility sites for data monitoring were reviewed and selected. Each of these sites will be instrumented and its energy requirements monitored and analyzed for one year prior to the selection of 40 Kilowatt fuel cell field test sites. Analyses in support of the selection of sites for instrumentation shows that many building sectors offered considerable market potential. These sectors include nursing home, health club, restaurant, industrial, hotel/motel and apartment. GRA

N83-31112# Science Research Council, Chilton (England).
ENERGY STORAGE FOR WIND-GENERATOR APPLICATION Report, Dec. 1981
F. M. Russel 1982 10 p
(PB83-165936; RL-81-081) Avail: NTIS HC A02/MF A01 CSCL 10C

A low-cost method was developed for storing energy and stiffening power supplied by wind generators. It involved inflatable, fabric-reinforced elastic liners buried underground and containing a fluid, probably water, at an intermediate pressure. The ground would be subject to elastic deformation and the method could be applicable to unstable ground such as deep sand, heterogeneous sedimentary or other unconsolidated deposits in remote locations or hostile environments. While the density of energy storage was considered low, compared with pumped-hydro systems, the technology could be attractive for developing countries. GRA

N83-30491*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SILICON SOLAR CELL CHARACTERIZATION AT LOW TEMPERATURES AND LOW ILLUMINATION AS A FUNCTION OF PARTICULATE IRRADIATION
Ann F. Whitaker, Sally A. Little, and Charles L. Peacock, Jr. *In* AGARD Environ. Effects on Mater. for Space Appl. Mar. 1983 9 p refs (For primary document see N83-30479 19-12)
Avail: NTIS HC A10/MF A01 CSCL 10A

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N83-31113 Prins Maurits Lab. TNO, Rijswijk (Netherlands).
EFFECTS OF RELEASE OF HYDRAZINE IN THE ENVIRONMENT [HET GEDRAG VAN HYDRAZINE BIJ VRIJKOMEN IN HET MILIEU]
A. Vermeij 1981 12 p refs In DUTCH; ENGLISH summary
(PML-1981-2; TDCK-75275) Copyright. Avail: Issuing Activity

Litterature on the ecological effects of an accidental release of hydrazine in the environment was surveyed. Consequences of an F16 aircraft accident where the hydrazine content of the emergency power unit is released into surface waters or onto the soil is considered. Release of the F16 hydrazine content into running water causes little danger to humans and animals. In surface water it causes fish mortality and temporary unsuitability as drinking water. Released into the soil, dangerous hydrazine vapors remain a few hours in the air. Author (ESA)

N83-31114# Junta de Energia Nuclear, Madrid (Spain). Div. de Medio Ambiente.
A COMPARISON BETWEEN THE MEASUREMENTS OF Kr-85 IN ENVIRONMENTAL SAMPLES BY LIQUID SCINTILLATION AND PROPORTIONAL COUNTERS
MaC. HeraslNigues and MaM. PerezGarcia 1983 17 p refs In SPANISH; ENGLISH summary
(JEN-531; ISSN-0081-3397; ISBN-84-500-8563-2) Avail: NTIS HC A02/MF A01

The most used methods for the measurement of Kr-85 beta activity after their concentration and separator are the liquid scintillation counting and the proportional counter. The beta activity of concentrated and isolated Kr-85 samples is measured in collaboration with the Max-Planck Institut fur Kernphysik, Aussenstelle Freiburg. Samples taken both in Madrid and Freiburg are measured by proportional counters in the Max-Planck Institut, Freiburg and by liquid scintillation counting in JEN, Madrid. The comparison of both measurements do not show appreciable discrepancy between the results obtained to both techniques. Author

N83-31115# Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Div. of Atmospheric Physics.

THE CSIRO (AUSTRALIA) ATMOSPHERIC CARBON DIOXIDE MONITORING PROGRAM: TEN YEARS OF AIRCRAFT DATA
G. I. Pearman, D. J. Beardsmore, and R. C. OBrien 1983 115 p refs
(TP-45; ISBN-0-643-03499-4) Avail: NTIS HC A06/MF A01

A description is given of modifications to the CSIRO carbon dioxide aircraft monitoring program. Details are provided of the methods used to establish the pressure-broadening carrier-gas corrections for the gas analysers used. With these corrections applied, the data are presented in the WMO 1981 CO2 Calibration Scale for the period 1972 through 1981. Author

N83-31116# Ohio State Univ., Columbus. Avionics Engineering Center.
INVESTIGATION OF WIDE-APERTURE LOCALIZER ARRAY AND MONITOR PERFORMANCE Final Report, Oct. 1980 - Apr. 1983
Joe Longworth, R. H. McFarland, and Rachel Pollard Apr. 1983 198 p refs
(Contract DTFA01-81-C-20004)
(DOT/FAA/PM-83/28; OU/AEC/EER-63-1) Avail: NTIS HC A09/MF A01

Measurements performed on the single array-22-8, the Wilcox 16-element, and the Redlich 14-element wide aperture localizer arrays are documented. Monitor fault tests are presented for the Redlich array. In addition, a section documenting the single array patterns for the Log Periodic Dipole (LPD), the O-ring traveling wave, and the Folded Dipole antennas is presented. Author

N83-31117# Argonne National Lab., Ill.
METHODOLOGY FOR ESTIMATING CROP LOSS FROM ACID DEPOSITION
P. M. Irving 1982 15 p refs Presented at the APCA Spec. Conf. on Atmospheric Deposition, Detroit, 7 Nov. 1982
(Contract W-31-109-eng-38)
(DE83-009622; CONF-821144-2) Avail: NTIS HC A02/MF A01

The effects of airborne pollutants on vegetative growth which was known for more than a century are examined. The acidic deposition phenomenon when implicated as a factor potentially responsible for crop yield losses is investigated. Experimental approaches utilized in traditional pollution effects research include: field surveys, sensitivity classification, dose response studies, and regional impact evaluation. Acid rain is a unique pollutant with special problems associated with researching its effects. The description of dose for this pollutant should include rain chemistry (not just pH), rainfall rate, duration of event, total deposition, droplet size, etc. These parameters must also be considered when simulating rain in controlled studies. Due to the potential for interactions with biotic and abiotic entities, factorial research designs and multivariate analyses may be necessary for investigations of acid rain impacts on crops. DOE

N83-31118# Junta de Energia Nuclear, Madrid (Spain). Div. de Medio Ambiente.
SOME CONSIDERATIONS ON THE USE OF GAMMA SPECTROMETRY FOR Kr-85 DETERMINATION AT GASEOUS EFFLUENTS IN THE NUCLEAR INDUSTRY AND ENVIRONMENTAL SAMPLES
MaC. HerasIniguez, MaM. PerezGarcia, and A. TravesiJimenez 1983 11 p refs In SPANISH; ENGLISH summary
(JEN-530; ISSN-0081-3397; ISBN-84-500-8562-4) Avail: NTIS HC A02/MF A01

The feasibility of using high resolution gamma ray spectrometry with GeLi semiconductor detector for measuring the 0.514 keV gamma radiation of Kr-85 was explored. The detection limit of Kr-85 for a measuring time is 4 x 10 to the -4 power mu Ci with a counting time of 1000 minutes in a GeLi detector with a 201 efficiency relative to the INa (T1). It is concluded that the one of gamma ray spectrometry for measuring the Kr-85 is not useful for environmental samples, but it can be used for the Kr-85 effluents control in Nuclear Stations. Author

N83-31119# Junta de Energia Nuclear, Madrid (Spain). Div. de Medio Ambiente.
DETERMINATION OF Kr-85 IN ENVIRONMENTAL SAMPLES AND GASEOUS EFFLUENTS FROM NUCLEAR INDUSTRIES USING THE STANDARD METHOD
MaC. HerasInigues and MaM. PerezGarcia 1983 31 p refs In SPANISH; ENGLISH summary
(JEN-532; ISSN-0081-3397) Avail: NTIS HC A03/MF A01

Environmental samples taken at JEN Laboratories (Madrid) and the Jose Cabrera (Zorita), Garolla and Vandello nuclear power stations as well as gaseous effluents from the three plants were analyzed. The sampling equipment used is described and the values found of Kr-85 activity in all the samples given. Author

N83-31120# Army Construction Engineering Research Lab., Champaign, Ill. Environmental Div.
THE ENVIRONMENTAL EARLY WARNING SYSTEM (EEWS): CONCEPT DESCRIPTION Final Report
Robert C. Lozar and Harold Balbach Jan. 1983 42 p ref
(DA Proj. 4A7-62720-A-896)
(AD-A127356; CERL-TR-N-144) Avail: NTIS HC A03/MF A01 CSCL 13/2

This report gives a concept description of the Environmental Early Warning System (EEWS) developed by the U.S. Army Construction Engineering Research Laboratory (CERL). The EEWS is an interactive computer system designed to give the Department of Army Headquarters and Major Command planning and decision-making personnel a way to quickly find potential environment-related problems associated with proposed changes in troop strength, mission, facilities, natural resource management, and land use. The system is designed to help Army managers during the earliest stages of Army planning and is not a substitute for current planning methods or Enivronmental Assessments or Impact Statements. Included are a system description from the user's point of view, a brief explanation of how the system calculates results, and descriptions of the system's tabular and location-specific data handling capabilities. GRA

N83-31121# Universal Technology Corp., Dayton, Ohio.
PROCEEDINGS OF THE DOD (DEPARTMENT OF DEFENSE) COMBINED ENVIRONMENT RELIABILITY TEST (CERT) WORKSHOP
Elbert E. Harbour, Robert V. Brown, Jack Lavery, Robert Hancock, Thomas Musson, Henry Caruso, Alan H. Burkhard, D. Brent Meeker, Ronald D. vonRohr, John F. Wagner, III et al Wright-Patterson AFB, Ohio AFWAL Jan. 1983 254 p refs Workshop held in Atlanta, 2-4 Jun. 1981
(Contract F33657-80-C-0255; AF Proj. 0203)
(AD-A127339; AFWAL-TR-83-3003) Avail: NTIS HC A12/MF A01 CSCL 05/11

A DoD workshop was held 2-4 June 1981 at Atlanta, Georgia. Seventy-six representatives from industry and government attended the workshop. The workshop addresses the cost and technical effectiveness of Combined Environment Reliability Testing (CERT), need for Environmental hardware engineers, need for government CERT facilities and the blending of MIL-STD-781 and MIL-STD-810. Technical papers on recent DoD CERT experience were also presented. In general, it was found that CERT was ready for implementation, there is a need for government Environmental Hardware engineers and CERT facilities and MIL-STD-810 and MIL-STD-781 environmental criteria should complement each other. GRA

N83-31122# Department of Energy, Morgantown, W. Va. Energy Technology Center.
ADVANCED ENVIRONMENTAL CONTROL TECHNOLOGY
May 1982 53 p refs
(DE83-009222; DOE/METC-SP/194) Avail: NTIS HC A04/MF A01

The advanced environmental control technology (AECT) program consolidated cleanup efforts in ongoing technology-specific programs with new projects initiated in a coordinated program that addresses cleanup technolgy development is

discussed. The strategy of the AECT program is to develop flue gas cleanup, hot gas stream cleanup, process modifications, and associated waste management techniques that permit the conversion of existing utility or industrial energy systems to coal use or for the siting of new facilities. Applied research, systems analysis, and instrumenation studies are included to support the main program thrust and to determine optimum combinations of control technologies and power systems components. The projects within the three areas of AECT is described. DOE

N83-31123# Argonne National Lab., Ill. Radiological and Environmental Research Div.

EFFECTS OF TEMPORAL VARIATIONS IN THE ACIDITY OF RAIN ON CROP RESPONSE TO ACIDIC DEPOSITION (TASK FORCE PROJECT)

Joseph E. Miller and Patricia M. Irving 1983 9 p refs Presented at the Acid Rain Program Rev. Meeting, Raleigh, N.C., 21 Feb. 1983

(Contract W-31-109-eng-38)

(DE83-009507; CONF-830216-3) Avail: NTIS HC A02/MF A01

The variation of rainfall pH from one event to another may have important biological consequences in several respects. Rainfall events at low pH values may be more damaging than the same total hydrogen ion deposition spread cut over a larger number of events with higher pH values. The variation of rainfall pH within events may also affect biological response. Rain water which falls during the very last stages of an event remains on the vegetation until it evaporates. This particular rain may have a significantly greater effect. The effect of total hydrogen ion deposition received by plant surfaces over a long period of time is the most important parameter due to the cumulative stress imposed on the plant tissue over the entire period of exposure. Experiments will determine which of these hypotheses best represents the response of a particular, economically important crop species to the impact of more realistically programmed, acid rain simulant treatments. Design of the experiments is discussed. DOE

N83-31124# TRC Environmental Consultants, Inc., East Hartford, Conn.

AIR-POLLUTION DAMAGE TO MAN-MADE MATERIALS: PHYSICAL AND ECONOMIC ESTIMATES Final Report

A. R. Stankunas, D. F. Unites, and E. F. McCarthy Feb. 1983 85 p Sponsored by EPRI

(EPRI Proj. 1004-1)

(DE83-901464; EPRI-EA-2837) Avail: NTIS HC A05/MF A01

This report considers the damage to three materials from SO air pollution in a northeastern urban area (Boston). The three materials studied were paint, galvanized steel, and structural concrete (exclusive of paving). Using a field survey of 357 individual sites, the study estimated the quantities of these materials exposed to different concentrations of SO2 for the entire urban study area and for the neighborhoods. Given the quantities of exposed materials, the study attempted to present economic estimates of the damage from SO2 to the study materials. No adequate damage function could be found for concrete; hence, no estimate of the SO2 damage to concrete is possible. The damage to paint varied considerably depending upon the damage function used, thus reflecting the uncertainty of the estimate. For the entire urban study area, the annual damage to paint ranged from $830,000 to $31,300,000. For galvanized steel, the estimated annual damage from SO2 for the total study area was only $335,000. Estimates of damage are also presented by neighborhood. Some of the fundamental concepts necessary for materials damage estimates are reviewed in an appendix to the report. There is also a discussion of several key papers that previously estimated material damage from SO2. DOE

N83-31125# Pacific Northwest Lab., Richland, Wash.

LONG-TERM SIMULATION OF SEDIMENT AND CONTAMINANT TRANSPORT

Y. Onishi and D. S. Trent Feb. 1983 22 p refs Presented at the EPA/NRC Minerals Management Service Workshop, Santa Barbara, Calif., 7 Feb. 1983

(Contract DE-AC06-76RL-01830)

(DE83-007652; PNL-SA-11182; CONF-830219-1) Avail: NTIS HC A02/MF A01

To assess the potential adverse impact of drilling mud and cuttings in the receiving water body, both short and long term migration and fate of sediment and contaminants are evaluated. The long term behavior of these contaminants are controlled by the transport due to water and sediment movements, intermedia transfer such as adsorption/desorption, chemical and biological degradation and possibly transformation, given the source characteristics of drilling mud and cuttings. Four unsteady sediment contaminant (both dissolved and particulate contaminant) transport models having the sediment contaminants interactions such as adsorption/desorption and transport, deposition and resuspension of sediment sorbed contaminants were developed. Among them are the three dimensional model, FLESCOT and the two dimensional model, FETRA. These models calculate time varying distributions of sediments for each sediment size fraction or type. DOE

N83-31126# Johns Hopkins Univ., Shadyside, Md.

BIOGEOCHEMISTRY OF TRACE METALS IN CHESAPEAKE BAY. 1: NUTRIENT PRODUCTION AND TRANSPORT IN THE ANOXIC DEEP WATER OF THE POTOMAC RIVER ESTUARY. 2: DISSOLVED ORTHOPHOPHATE PRODUCTION AND TRANSPORT IN THE ANOXIC DEEP WATER OF THE CHESAPEAKE BAY Final Report, 1 Apr. 1981 - 31 Mar. 1982

Jerome Gavis Mar. 1983 33 p refs

(Contract DE-AC02-76EV-03292)

(DE83-008371; DOE/EV-03292/3) Avail: NTIS HC A03/MF A01

Concentrations of dissolved orthophosphate and ammonia determined during a 43 hr period in the lower Potomac River estuary varied with depth and with time at any depth, but were independent of time when expressed as functions of salinity. The concentration/salinity profiles in the anoxic deep water could be described by the solution of a differential equation, which was obtained by transformation of the partial differential equations for transport of salt and of a non-conservative nutrient. The solution was expressed in terms of a dimensionless parameter, phi, equivalent to the ratio of a characteristic nutrient production rate to a characteristic nutrient diffusion rate. Estimates of phi, obtained by means of non-linear parameter analysis, were 1.13 for dissolved orthophosphate and 1.03 for ammonia. This means that about half of the nutrients in the anoxic deep water were produced in the water by anaerobic mineralization of detritus, and half were transported into the water with salt from higher salinity water down the estuary. DOE

N83-31127# California Univ., Livermore. Lawrence Livermore Lab.

EFFECTS OF COPPER SPECIATION ON AQUATIC ECOSYSTEMS

Florence L. Harrison 1983 36 p refs Presented at the Workshop on Effects of Trace Elements on Aquatic Ecosystems, Raleigh, N.C., 23-24 Mar. 1982

(Contract W-7405-eng-48)

(DE83-009241; UCRL-88867; CONF-8203123-1) Avail: NTIS HC A03/MF A01

The kinds and quantities of copper species present in influent and effluent waters were determined in samples collected from power stations located adjacent to marine, estuarine, and freshwater ecosystems. Copper concentration and speciation differed with the site, season, and mode of operation of the station. Under normal operating conditions, the differences between influent and effluent waters were generally small and, at those sites where measurements of chemical form were taken, most of the copper was in bound (complexed) species. During startup of water circulation through cooling systems and during changeover from an open- to a closed-cycle operation, however, copper was high in concentration. The size, chemical form, and duration of the copper pulse released during startup and changeover differed with factors such as the interval between shutdown and startup,

preconditioning of the condenser tubing, and hydrodynamic conditions. DOE

N83-31128# California Univ., Berkeley. Lawrence Berkeley Lab. Energy and Environment Div.
COMPARATIVE STUDY OF NO MEASUREMENT IN METHANE/AIR FLAMES
E. Cuellar (Raychem Corp., Menlo Park, Calif.) and N. J. Brown Oct. 1982 36 p refs Presented at the Combustion Inst. Symp. on Western States Section, Livermore, Calif., 11 Oct. 1982
(Contract DE-AC03-76SF-00098)
(DE83-002229; LBL-15062; CONF-821035-8) Avail: NTIS HC A03/MF A01

A comparative study of nitric oxide measured in the postcombustion environment of an atmospheric premixed CH4/air stoichiometric flat flame was conducted. an uncooled quartz microprobe was used for sample extraction, and analysis was accomplished and viscosity corrections. The in situ optical technique employed is called tunable atomic line molecular spectroscopy (TALSM), and is based on the splitting and polarization of atomic emission lines induced by an external magnetic field. Concentrations of NO were determined by doping the burner with known amounts of NO. At NO doping levels near 1500 ppM, the ratio NO/sub optical/NO/sub probe/ = 1.3 was in agreement with that reported by others. The high sensitivity of the TALMS technique permitted measurement in the thermal NO range. Optical measurements of thermal NO were found to be approximately three times larger than the corresponding probe measurements. DOE

N83-31129# Pacific Northwest Lab., Richland, Wash.
PREDICTING INDOOR AIR POLLUTION LEVELS
G. B. Parker, J. G. Droppo, and P. C. Owczarski Oct. 1982 11 p refs Presented at the APCA Pacific Northwest Intern. Section Ann. Meeting, Vancouver, B.C., 15 Nov. 1982
(Contract DE-AC06-76RL-01830)
(DE83-003470; PNL-SA-10621; CONF-821131-1) Avail: NTIS HC A02/MF A01

Methods of predicting concentration levels of indoor air pollution in a variety of residences by using residence air-infiltration rates, residence volumes, and source terms, and by making assumptions about occupant lifestyle and pollutant distribution are discussed. The range of the maximum to minimum concentration, as well as a representative value of each pollutant present in a residence can be predicted. The predicted values vary for some pollutants by up to three orders of magnitude. The methods can be used for predicting concentration levels in residences with and without retrofitted air-infiltration reduction measures, which are means of making the home more energy efficient. Concentration levels are predicted so that the the risk of health effects from installing air-infiltration reduction measures can be assessed. DOE

N83-31130# Stanford Univ., Calif. Dept. of Civil Engineering.
TRACE ORGANIC DEGRADATION IN BIOFILM PROCESSES Final Report
Perry L. McCarty, Edward J. Bouwer, Mark Montgomery, Laurie LaPat-Polasko, and Bruce E. Rittmann Oct. 1982 160 p refs
(Grant NSF ENG-79-05707)
(PB83-172973; TR-268; NSF/CEE-82082) Avail: NTIS HC A08/MF A01 CSCL 13B

The hypothesis that some trace organic compounds have a threshold below which the concentration cannot be reduced by bacterial action was examined. Also studied were environmental factors that might affect the rate and lower concentration limits for bacterial decomposition of organic materials by biofilms. Batch and continuous flow-column studies were performed, using aerobic and anaerobic conditions and mixed and pure cultures. Under aerobic conditions, a group of chlorinated benzenes and aromatic hydrocarbons was found to be biodegradable, and under anaerobic conditions, several chlorinated aliphatic compounds were biotransformed. Radiotracer studies indicated that the chlorinated benzenes were oxidized to carbon dioxide; no indication of intermediate compound formation was obtained. The lower limits for acetate and propionate when used as primary substrates were investigated. GRA

N83-31131# Vermont Univ., Burlington. Water Resources Research Center.
HEAVY METALS IN ACID PRECIPITATION
David R. Hemenway Dec. 1982 36 p refs
(PB83-175273; W83-02182; OWRT-A-046-VT(1)) Avail: NTIS HC A03/MF A01 CSCL 13B

Precipitation samples were collected sequentially on a subevent basis. Specific contaminants in the segmented precipitation samples were measured for seven separate events. The concentration of Al, Cd, Pb, and V in the subsamples of each event analyzed were determined along with sample pH. In the last three events, sulfate, nitrate, and chloride concentrations were also measured. Results indicate that chemical constituents in precipitation vary greatly with time. Removal of certain contaminants may be greatly affected by scavenging efficiencies of cloud and rain drops, and aerodynamic and chemical behavior of the aerosol rather than simple washout/dilution effects. Author (GRA)

N83-31132# Rogers, Golden and Halpern, Inc., Philadelphia, Pa.
STATE-OF-THE ART ENVIRONMENTAL ASSESSMENT OF ON-SHORE DISPOSAL OF MANGANESE NODULE REJECTS Open-File Report, Sep. 1980 - Jun. 1982
P. A. Kennedy, E. O. Porter, J. L. Deis, F. C. Brown, and R. E. Varsaw 30 Jul. 1982 240 p refs Prepared in cooperation with EIC Inc., Newton, Mass., and Golder Associates, Lakewood, Colo.
(Contract DI-BM-J0-100085)
(PB83-175380; BM-OFR-49-83) Avail: NTIS HC A11/M A01 CSCL 08I

An environmental assessment on onshore waste disposal that is expected to occur with the development of commercial deep seabed mining was conducted in order that testing and refinement of nodule waste disposal techniques can be completed prior to 1988, when commercial seabed mining can begin under U.S. legislation. Three classes of process and four classes of waste disposal techniques were identified, and five sites were selected as representative of first-generation nodule operations. Each site-process-disposal technique combination was compared against potential effects to determine important characteristics of the rejects and the sites. Regulatory requirements were also considered at each site to identify important issues and their effect on the permitting process. Author (GRA)

N83-31133# Cornell Univ., Ithaca, N. Y. Center for Environmental Research.
ACID PRECIPITATION EFFECTS ON ALGAL PRODUCTIVITY AND BIOMASS IN ADIRONDACK LAKES Final Completion Report
George R. Hendrey Dec. 1982 12 p Sponsored in part by Office of Water Research and Technology, Washington, D.C.
(Contracts DI-14-34-0001-8034; DI-14-34-0001-9034; DI-14-34-0001-0134)
(PB83-173203; W83-02129; OWRT-A-078-NY(1)) Avail: NTIS HC A02/MF A01 CSCL 08H

Relationships between phytoplankton communities and lake acidity in three Adirondack Mountain Lakes were studied at Woods Lake, Sagamore Lake (pH ca. 5.5), and Panther Lake (pH ca. 7.0). Numbers of phytoplankton species observed were Woods 45, Sagamore 55, and Panther 85, conforming to observations at many other sites that species numbers decrease with increasing acidity. The smaller plankton are relatively more important in the more acid lakes, Woods > Sagamore > Panther. This pattern could be determined by nutrient availability (lake acidification is suspected of leading to decreased availability of phosphorus). The amount of 14C-labelled dissolved photosynthate (14C-DOM), as a percent of total productivity, is ordered Woods > Sagamore > Panther. Author (GRA)

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N83-31134# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
RECURSIVE CALCULATION OF GEOPOTENTIAL ACCELERATION [CALCULO RECURSIVO DA ACELERACAO DO GEOPOTENCIAL]
Helio Koiti Kuga, Valder Matos deMedeiros, and Valdemir Carrara May 1983 64 p refs In PORTUGUESE; ENGLISH summary
(INPE-2735-RPE/433) Avail: NTIS HC A04/MF A01

FORTRAN routines to calculate geopotential, which is modelled using Goddard Earth Model 10 (GEM10) spherical harmonic coefficients, are presented. Recursive equations are utilized in order to calculate the fully normalized Legendre polinomials in order to obtain quick processing and better numerical accuracy. The influence of each type of harmonic coefficients is illustrated separately by numerical tests. Author

N83-31135# Herzberg Inst. of Astrophysics, Ottawa (Ontario).
STUDIES OF HIGH LATTITUDE CURRENT SYSTEMS USING MAGSAT VECTOR DATA Final Report, 30 Sep. 1981 - 30 Apr. 1983
J. Ronald Burrows, T. J. Hughes, D. D. Wallis, and Margaret D. Wilson 30 Apr. 1983 71 p refs
(Investigation-M-40) Avail: NTIS HC A04/MF A01

Modelling of high latitude currents, coordinate systems for data prevention, small scale perturbations, simple current systems, current intensity ratios, transverse perturbations in the polar cap, weak current systems, data processing, source data, interplanetary magnetic field data, and crustal anomaly fields removal are discussed. Author

N83-31136# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
SODIUM CLOUDS IN THE LOWER THERMOSPHERE
V. W. J. H. Kirchhoff and H. Takahashi Jul. 1983 21 p refs Presented at the 35th SPBC Meeting, 6-13 Jul. 1983
(INPE-2793-PRE/355) Avail: NTIS HC A02/MF A01

Very large short lived enhancements observed in Na nightglow measurements are described. Only nine such events have been observed in about 8 years of regular nocturnal observations at 23 deg S. These enhancements are believed to be due to excess sodium deposited in the upper atmosphere by meteoroid ablation. Author

N83-31137# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
OBSERVATIONAL STUDY ON THE UPPER TROPOSPHERIC COLD LOWS IN BRAZILIAN SOUTH AND WEST ATLANTIC SUBTROPICAL LATITUDE M.S. Thesis [UM ESTUDO OBSERVACIONAL SOBRE AS BAIXAS FRIAS DA ALTA TROPOSFERA, NAS LATITUDES SUBTROPICAIS DO ATLANTICO SUL E LESTE DO BRASIL]
Manoel Alonso Gan Mar. 1983 12 p refs In PORTUGUESE; ENGLISH summary
(INPE-2685-TDL/126) Avail: NTIS HC A04/MF A01

Upper tropospheric cold lows in the subtropics are studied. From satellite imagery it is observed that the moist lows (those having significant cloudiness) form in the period of May to September. The formation of these cyclones is preceded by the intensification of a ridge to the southwest. The cold lows are observed to move eastward when they are embedded in the mid latitude flow. When they are cut off from this flow, the advection of planetary vorticity dominates and, therefore, the cold lows drift to the west. A possible explanation for their maintenance is the infusion of cold air from upper air troughs at higher latitudes. Author

N83-31138*# National Aeronautics and Space Administration, Washington, D. C.
MATHEMATICAL DEVELOPMENTS REGARDING THE GENERAL THEORY OF THE EARTH MAGNETISM
Adolf Schmidt Jan. 1983 60 p refs Transl. into ENGLISH of Arch. der Deut. Seewarte (West Germany), 12 Ann. Ed., no. 3, 1889 p 1-29 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NAS2-3542)
(NASA-TM-77103; NAS 1.15:77103) Avail: NTIS HC A04/MF A01 CSCL 08G

A literature survey on the Earth's magnetic field, citing the works of Gauss, Erman-Petersen, Quintus Icilius and Neumayer is presented. The general formulas for the representation of the potential and components of the Earth's magnetic force are presented. An analytical representation of magnetic condition of the Earth based on observations is also made. B.W.

N83-31139*# National Aeronautics and Space Administration, Washington, D. C.
DETERMINATION OF THE CUMULUS SIZE DISTRIBUTION FROM LANDSAT PICTURES
E. Karg, H. Mueller, and H. Quenzel Apr. 1983 7 p ref Transl. into ENGLISH from Ann. der Meteorol. (West Germany), no. 18, 1982 p 142-144 Original language document was announced as A82-45744 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77070; NAS 1.15:77070) Avail: NTIS HC A02/MF A01 CSCL 04A

Varying insolation causes undesirable thermic stress to the receiver of a solar power plant. The rapid change of insolation depends on the size distribution of the clouds; in order to measure these changes, it is suitable to determine typical cumulus size distributions. For this purpose, LANDSAT-images are adequate. Several examples of cumulus size distributions will be presented and their effects on the operation of a solar power plant are discussed. Author

N83-31140# Naval Postgraduate School, Monterey, Calif.
EXPERIMENTAL OBSERVATIONS OF GEOMAGNETIC MICROPULSATIONS: LAND AND SEA M.S. Thesis
Edward Wayne Pogue Dec. 1982 88 p refs
(AD-A127280) Avail: NTIS HC A05/MF A01 CSCL 08/14

Data taken from the second generation of the Naval Postgraduate School's ocean floor and land geomagnetic data collection system is analyzed to determine the wave nature of Geomagnetic Pulsations in the .05 to 10 Hz range. The measurements were made in Monterey, California during June to September 1982. Three of these experiments were twenty-four hours in length. During two such experiments land and sea data were transmitted to a central point where the signals were recorded simultaneously. Geomagnetic fluctuations were analyzed to determine various factors characterizing the waves. These factors include the power spectral densities, coherences, Stokes parameters, orientation angle, degree of polarization, and ellipicity. The software developed in this research provides an extensive capability for analysis of geomagnetic noise. Long term data collection can utilize it to establish trends in both the spatial and temporal properties of naturally occurring ELF electromagnetic fields. Author (GRA)

N83-31141# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ELECTRON LOSSES FROM THE MAGNETOSPHERE M.S. Thesis
Roger Scott Dewey Mar. 1983 136 p refs
(AF Proj. 8809)
(AD-A127324; AFIT/GNE/PH/83M-4) Avail: NTIS HC A07/MF A01 CSCL 08/14

A semi-empirical method for modelling the loss of electron fluxes in the Earth's magnetosphere was developed. An equation for the integral-energy omnidirectional electron flux as a function of time and magnetic field strength was derived from pitch-angle

diffusion theory. This flux equation was the basis for a computer data-fitting program written at the Air Force Weapons Laboratory (AFWL) to fit the AFWL Trapped Electron Data Base. The program utilized a least-squares fit and incorporated random variations of the characteristic exponential loss times about their initial values. An improved table of initial less times was compiled for use with the program. The derived flux model showed substantial agreement with the empirical data base. Representative plots of computed flux over raw data are shown for L-values of 2.3 and 2.4.
Author (GRA)

N83-31142# California Univ., Berkeley. Lawrence Berkeley Lab.
MEXICAN-AMERICAN COOPERATIVE PROGRAM AT THE CERRO PRIETO GEOTHERMAL FIELD: ANALYSIS OF THE NUEVO LEON MAGNETIC ANOMALY AND ITS POSSIBLE RELATION TO THE CERRO PRIETO MAGMATIC-HYDROTHERMAL SYSTEM
N. E. Goldstein, M. J. Wilt, and D. J. Corrigan Oct. 1982 10 p refs Presented at the 4th Symp. on the Cerro Prieto Geothermal Field, Guadalajara, Mexico, 10-12 Aug. 1982
(Contract DE-AC03-76SF-00098)
(DE83-009138; LBL-14900; CONF-8208109-3) Avail: NTIS HC A02/MF A01

The broad dipolar magnetic anomaly whose positive peak is centered near Ejido Nuevo Leon, some 5 km east of the Cerro Prieto I Power Plant, has long been suspended to have a genetic relationship to the thermal source of the Cerro Prieto geothermal system. This suspicion was reinforced after several deep geothermal wells, drilled to depths of 3 to 3.5 km over the anomaly, intersected an apparent dike-sill complex consisting mainly of diabase but with minor rhyodacite. A detailed fit of the observed magnetic field to a computer model indicates that the source may be approximated by a tabular block 4 by 6 km in area, 3.7 km in depth, 2.3 km thick, and dipping slightly to the north. Mafic dike chips from one well, NL-1, were analyzed by means of electron microprobe analyses which showed them to contain a titanomagnetite that is paramagnetic at in-situ temperature conditions. As the dike mineralogy does not account for the magnetic anomaly, the magnetic source is believed to be a deeper, magnetite-rich assemblage of periodotite-gabbro plutons. DOE

N83-31143# Los Alamos Scientific Lab., N. Mex.
HEURISTIC INTRODUCTION TO GRAVITATIONAL WAVES
Vernon D. Sandberg 1982 7 p refs Presented at the Workshop on Sci. Underground, Las Alamos, N. Mex. 27 Sep. - 1 Oct. 1982
(Contract W-7405-eng-36)
(DE83-007546; LA-UR-83-333; CONF-820989-5) Avail: NTIS HC A02/MF A01

A rough and heuristic theoretical background and introduction to gravitational radiation, its generation, and its detection based on Einstein's general theory of relativity is presented. The phenomenon of gravitational waves is described. DOE

N83-31144# Stanford Univ., Calif. Dept. of Geophysics.
SONIC AND ELECTRICAL PROPERTIES OF PARTIALLY SATURATED TIGHT-GAS SANDS Final Report
Amos Nur Mar. 1983 60 p refs
(Contract DE-AS19-81BC-10498)
(DE83-009472; DOE/BC-10498/5) Avail: NTIS HC A04/MF A01

The seismic and the electrical properties of tight gas rocks were related to their pore space geometry, permeability, and level of water saturation. Results of a laboratory experimental study of wave propagation in Cotton Valley and Spirit River Sandstones were studied as a function of partial water saturation (SW) and wave frequency. It was found that wave velocities and the velocity ratio are sensitive to the presence of gas. Furthermore, wave attenuation is sensitive to the amount of gas in the pore space. Ultrasonic measurements in tight gas sands tend to yield higher velocity values, due to the inability of the pore fluid pressure to homogenize during the passage of waves. Laboratory measurements were made also of the complex electrical response of selected tight rocks, and compared with normal permeability Berea Sandstone. The results show that the dielectric property of tight gas sands is very sensitive to partial water saturation, and may give not only insight into the nature of the pore space, but also provide a practical measure of S sub w in situ. DOE

N83-31145# California Univ., Livermore. Lawrence Livermore Lab.
SINGLE-STATION LOCATIONS OF SEISMIC EVENTS
N. Burr 19 Nov. 1982 23 p refs
(Contract W-7405-eng-48)
(DE83-006668; UCID-19667) Avail: NTIS HC A02/MF A01

This report describes the progress being made in event locations using a single 3 component station. In this study locations are obtained using a backazimuth determined by the particle motion of Pn and a distance determined by differential travel times between Pn, Pg, and Lg relative to a master event of known location. The data set used consists of the seismic signals from 11 nuclear events at the Nevada Test Site (NTS) and recorded at the four Lawrence Livermore National Laboratory (LLNL) seismic stations. Elko, Kanab, Landers, and Mina. The stations range from 230 km to 400 km away from the events. The local magnitude (M/sub L/) of the events range from 3.7 to 5.6 with the small events barely visible over the microseisms. All calculations and observations are made after the events have been filtered between 0.3 and 6 Hz. The results of this analysis show that backazimuth can be determined to within + or - 5 deg of the true backazimuth, about 90% of the time, after systematic variations are taken out. DOE

N83-31146# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Geology.
DEEP-BURIAL DIAGENESIS Annual Progress Report, 1982 - 1983
Gerald M. Friedman 1983 75 p refs
(Contract DE-AC02-81ER-10921)
(DE83-009378; DOE/ER-10921/T1) Avail: NTIS HC A04/MF A01

The effects of deep burial on creation and elimination of porosity and on changes in textures of carbonate rocks are discussed. Two parallel lines of investigation were employed: experimental compaction tests at various temperatures, pressures, and interstitial fluid compositions of natural carbonate sediments were performed, and petrographic and mechanical log analysis of carbonate rocks from boreholes of some of the world's deepest carbonate hydrocarbon (gas) reservoirs were performed. In compacted ooids in the presence of distilled water, neomorphic microspar of calcite pseudomorphically replaced aragonite, with survival in places, in the ooids of parts of their original fabric. Most of the ooids, replaced neomorphically, retained concentric rims however. Ooids and skeletal particles compressed at 150, 200 and 250 C and at 1.5 and 2.4 kilobars, consistent with burial depth of 6 and 9 km showed appreciable volume reduction. DOE

N83-31147# Los Alamos Scientific Lab., N. Mex. Earth and Space Sciences Div.
CHEMICAL AND TEXTURAL SURFACE FEATURES OF PYROCLASTS FROM HYDROVOLCANIC ERUPTION SEQUENCES
Kenneth H. Wohletz 1983 35 p refs Presented at the Workshop on Characterization and Quantification of Surface Features on Clastic and Pyroclastic Particles, Tempe, Ariz., 19 Apr. 1983
(Contract W-7405-eng-36)
(DE83-006074; LA-UR-83-250; CONF-830409-1) Avail: NTIS HC A03/MF A01

Hydrovolcanic pyroclasts are produced by the interaction of erupting magma with surface or near-surface water. Eruption energy determining pyroclast transport and depositional modes is dependent upon the amount of water interacting with magma. Grain morphologies, size distributions, surface textures, and chemical effects studied record the history of eruption cycles for volcanoes under consideration. Samples of crater-rim stratigraphic sequences from Crater Elegante and Cerro Colorado, Mexico, and from Panum Crater and Obsidian Dome, California, illustrate a basaltic tuff ring and tuff cone and two rhyolitic tuff rings respectively. Grain morphologies observed by scanning electron microscopy (SEM) reveal information on the process of melt fragmentation. Surface

alteration and diagenesis have greater effect on pyroclasts from wet eruptions compared to dry ones. These textures are patchy overgrowths of microcrystalline and hydrated materials. Surface chemical characteristics observed with energy dispersive spectral analysis (EDS) show relative gains or losses of elements and an apparent enrichment of silica on altered surfaces. DOE

N83-31148# Lamont-Doherty Geological Inst., Palisades, N. Y.
EARTHQUAKE HAZARD STUDIES IN NEW YORK STATE AND ADJACENT AREAS Final Report, Apr. 1976 - Jun. 1982
A. L. Kufka Jan. 1983 76 p refs
(DE83-901345; NUREG/CR-3079) Avail: NTIS HC A05/MF A01; SOD HC $5.00

Research related to the operation of a network of 38 short period seismic stations is discussed. Lamont-Doherty Geological Observatory (LDGO) currently operates a network of 38 short period seismic stations in the states of New York, New Jersy and Vermont. It is part of the larger Northeastern United States Seismic Network operated by several university groups in New York, New Jersey, Pennsylvania and New England. These networks provide a wealth of data to study seismicity, earthquake hazards, earthquake source properties, tectonic processes, and crustal and upper mantle structure in the northeastern United States and adjacent parts of Canada. The LDGO network provides data for more specific studies of earthquake processes in New York State and adjacent areas. DOE

N83-31149# Foster Wheeler Corp., Livingston, N.J.
LABORATORY ANALYSES OF OIL SHALES FOR US DEPARTMENT OF ENERGY, LARAMIE ENERGY TECHNOLOGY CENTER
Laramie, Wyo. DOE Mar. 1983 180 p
(Contract DE-AC20-82LC-10910)
(DE83-008498; DOE/LC-10910/T1) Avail: NTIS HC A09/MF A01

Analytical tests were performed on six samples of raw oil shale, two identified as Eastern, two identified as Colorado and the remaining two as Utah. This report covers the following aspects of this study: testing methods; sample preparation for specific tests; overall analytical summary tabulation; conclusions; specific enthalpy results; thermogravimetric analysis results; slag viscosity results; ash fusion temperature results; gross heating value results; elemental analysis results; and mineral analysis results. Procedures for drop calorimetry thermogravimetric analysis, differential thermal analysis and viscosity measurements are provided in the appendices. DOE

N83-31150# Oklahoma Univ., Norman.
SEISMICITY AND TECTONIC RELATIONSHIPS OF THE NEMAHA UPLIFT IN OKLAHOMA: PART 5 Final Report
Kenneth V. Luza, James E. Lawson, Jr., Christopher Barrett, Joseph M. Hayden, Noel F. Rasmusser., Ronald J. Santiago, and Robert C. Shoup Feb. 1983 127 p refs
(DE83-901537; NUREG/CR-3109-Pt-5) Avail: NTIS HC A07/MF A01; SOD HC $5.50

The Nemaha Ridge is composed of a number of crustal blocks typically 3 to 5 miles (5 to 8 km) wide and 5 to 20 miles (8 to 32 km) long. Structure-contour maps prepared of the top of the Viola Formation (Ordovician), the base of the Pennsylvanian, and the top of the Oswego Formation (Middle Pennsylvania) reveal a complex fault pattern associated with the Nemaha Uplift. This fault pattern is dominated by several discontinuous uplifts, such as the Oklahoma City, Lovell, Garber, and Crescent Uplifts. A detailed study of the Oklahoma City Uplift suggests that a number of the Nemaha-related faults were developed in pre-Mississippian time. A lineament map was prepared for north-central Oklahoma. A detailed gravity map was prepared for the Kingfisher and Medford maxima. A total-intensity aeromagnetic map for the Enid and Oklahoma City 1 deg. by 2 deg. Quadrangles was prepared. DOE

N83-31151# Geological Survey, Bloomington, Ind.
FAULTING IN SOUTHWEST INDIANA
C. H. Ault and D. M. Sullivan Oct. 1959 59 p refs
(DE83-900411; NUREG/CR-2908) Avail: NTIS HC A04/MF A01; also Avail: SOD $4.75

Faults of the Wabash Valley Faults System, faults in Perry and Spencer Counties, Indiana, and the Mt. Carmel Fault are of the normal type and high angle and occur as single fault planes or as well defined compound faults as much as 50 miles long with displacements ranging from a few feet to more than 400 feet. The Wabash faults and those in Perry and Spencer Counties were formally mapped, described, and named for the first time. Although supporting deep drilling data are sparse, the Wabash and Mt. Carmel faults are probably present at depth, where they may form major structural alignments in basement rocks. The Wabash and Perry and Spencer County faults are post-Pennsylvanian and pre-Pleistocene in age. The Wabash faulting is probably related to the regional tectonics that produced the New Madrid disturbance, but it is not a direct continuation of New Madrid faulting across the Rough Creek Fault Zone. DOE

N83-31152# Oesterreichische Akademie der Wissenschaften, Vienna. Inst. fuer Weltreaumforschung.
LOW ENERGY ELECTRON MEASUREMENTS DURING THE ENERGY BUDGET CAMPAIGN ON THE PAYLOAD E2-A
A. Urban and K. M. Torkar 1982 26 p refs Presented at IAGA meeting, Edinburgh, Aug. 1981 Sponsored by Austrian Council for Scientific Research Prepared in cooperation with Graz Univ.
(IWF-8202) Avail: NTIS HC A03/MF A01

Energetic electrons were measured in the energy range 0.2 to 25 keV with three detectors covering a pitch angle range 10 to 170 deg with high angular resolution. Peaked energy spectra of downgoing electrons of higher energies were observed together with burstlike large pitch angle variations. The payload encountered a region of pulsating high energy electrons for approximately 100 sec accompanied by a slow depleting of the loss cone. For most of the flight time the trapped electrons remained constant. The ion production rates calculated from the energetic electrons are presented. Author (ESA)

N83-31153# Oesterreichische Akademie der Wissenschaften, Vienna. Inst. fuer Weltraumforschung.
TESTS OF AN ION CHEMICAL MODEL OF THE D-REGION
K. M. Torkar and M. Friedrich Apr. 1982 44 p refs Supersedes INW-8004 Prepared in cooperation with Graz Univ.
(IWT-8204; INW-8004) Avail: NTIS HC A03/MF A01

A simple steady-state ion-chemical model for the midlatitude D and E regions is presented. Solar fluxes and the variation of neutral constituents are taken from the literature. The results are compared step by step to available relevant measurements: ion composition, electron density variation with solar zenith angle, solar activity, season and latitude. Although the agreement with the measurements is not always good, it is better than that of purely statistical ionospheric models. Author (ESA)

N83-31154# Oesterreichische Akademie der Wissenschaften, Vienna. Inst. fuer Weltraumforschung.
PARAMETER ESTIMATION OF MAGNETOSPHERIC PARTICLE DISTRIBUTIONS IN THE ENERGY RANGE 20 TO 500 kEV
K. M. Torkar Apr. 1982 39 p refs Prepared in cooperation with Graz univ.
(IWF-8205) Avail: NTIS HC A03/MF A01

A computer program which analyzes the energy spectra of energetic magnetospheric particles is described. The instrument characteristics and experimental design of the geostationary satellite GEOS-2 which provided the raw data are indicated. The program is designed to run on a UNIVAC 1100/81 computer and requires a plotter and a terminal with basic display enhancement features. Three dimensional charts showing the spectral distribution of energetic electrons are included. Author (ESA)

N83-31155# Oesterreichische Akademie der Wissenschaften, Vienna. Inst. fuer Weltraumforschung.
COLLECTION OF D AND E REGION PLASMA DENSITIES PROCESSED AT THE TECHNICAL UNIVERSITY OF GRAZ
K. M. Torkar, M. Friedrich (Graz Univ.), and W. Riedler (Graz

Univ.) Dec. 1982 128 p refs Sponsored by Austrian Council for Scientific Research
(IWF-8208) Avail: NTIS HC A07/MF A01

A collection of 46 D and E region plasma density profiles, based either on a wave propagation experiment (Faraday rotation, differential absorption) of probe measurements normalized to the propagation data are presented. Most measurements were made at auroral latitudes. Author (ESA)

N83-31156# Uppsala Ionospheric Observatory (Sweden).
SPORADIC E AND MAGNETIC ACTIVITY
S. P. Manohar Rao (Andhra Univ., India) and Harald Derblom Dec. 1982 31 p refs Sponsored by UNESCO, Paris
(UIO-SR-82-01; ISSN-0349-2699) Avail: NTIS HC A03/MF A01

Sporadic E data covering a half-sunspot cycle period were used to study the influence of geomagnetic activity. The auroral subgroups show their seasonal maxima around equinoxes, with a corresponding temporal enhancement in the magnetic activity. A positive correlation is noted between the plasma density in auroral Es and magnetic activity while the temperate latitude subgroups show a decrease in the occurence with enhanced magnetic activity. Two diurnal maxima during conditions of low magnetic activity suggest that the semidiurnal component of the tidal wind is mainly responsible for temperature latitude E formation by the wind shear mechanism. During magnetically disturbed conditions, the data indicate an additional southward wind component, shifting the morning maximum in E occurrence to noon. Author (ESA)

N83-31157# Uppsala Ionospheric Observatory (Sweden).
OBSERVATIONS O STIMULATED ELECTROMAGNETIC EMISSIONS IN IONOSPHERIC HEATING EXPERIMENTS
B. Thide, H. Derblom, A. Hedberg, H. Kopka (Max-Planck Inst. fuer Aronomie, Katlenburg-Lindau, West Germany), and P. Stubbe (Max-Planck Inst. fuer Aeronomie, Katlenburg-Lindau, West Germany) 1983 27 p refs Presented at URSI Intern. Radio Symp., Fairbanks, Alaska, 9-13 Aug. 1982 Submitted for publication Sponsored by Swedish Natural Science Research Council and Deutsche Forschungsmeinschaft
(UIO-SR-83-02; ISSN-0349-2699) Avail: NTIS HC A03/MF A01

Induced sideband modes, due to stimulated electromagnetic emissions in the ionosphere, were observed around the frequency of a high-intensity HF radio wave transmitted from an ionospheric modification facility. The received HF spectrum was analyzed without diagnostic radar. The parametric decay instability, and, possibly, the stimulated Brillouin backscattering of the strong HF pump wave were identified. A series of narrow spectral peaks induced in the upper sideband by a transmission in extraordinary mode indicate the excitation of ion Bernstein modes. Very strong spectral features, upshifted from the 5.4 MHz pump by 20 to 45 kHz, are observed. By monitoring fixed frequencies in the lower and the upper sidebands of the ionospherically reflected modifying wave the intensity of the stimulated emissions is found to exhibit a conspicuous long as well as short-term variability. Author (ESA)

N83-31158# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
INDUCTIVE ELECTRIC FIELDS IN THE MAGNETOTAIL AND THEIR RELATION TO AURORAL AND SUBSTORM PHENOMENA
R. J. Pellinen (Finnish Meteorological Inst.) and W. Heikkila (Texas Univ., Richardson) Nov. 1982 114 p refs Submitted for publication Sponsored by Swedish Natural Science Research Council
(Grant NSF ATM-80-2594)
(TRITA-EPP-82-08; ISSN-0348-7539) Avail: NTIS HC A06/MF A01

An analytical model of magnetosphere inductive electric field in which the characteristic observations of a substorm onset are taken into account is described. Triggering is confined to a small local time sector. During moderate disturbances, the induction fields in the magnetotail are stronger by at least one order of magnitude than the average crosstail field. The rotational property of the induction field promotes energetics in a restricted area with dimensions equivalent to a few Earth radii. The model predicts the existance of highly localized cable type field-aligned currents appearing on the eastern and western edges of the expanding auroral bulge. The predictions agree with satellite observations and with data from two dimensional instrument networks.
Author (ESA)

N83-31159# California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
BETA VALUES FOR FORESHOCKS AND AFTERSHOCKS IN REAL AND SIMULATED EARTHQUAKE SEQUENCES
L. Knopoff, Y. Y. Kagan, and R. Knopoff 1982 17 p refs
(Grant NSF CEE-80-08588)
(PB83-173765; NSF/CEE-82076) Avail: NTIS HC A02/MF A01 CSCL 08K

The differences in b-values between foreshock and aftershock sequences can be shown to be a statistically significant property of real earthquake sequences if a sufficiently large number of cases is considered. These differences depend on the particulars of the data processing procedures used to define the sequences, such as spacetime windowing and definition of cutoff magnitude thresholds for completeness of catalogs, as well as other magnitude cutoffs. They are also a statistically significant property of long artificial, or synthetic catalogs in which all subsequent earthquakes are modeled as resulting from a stochastic time delay applied to predecessor earthquakes. It is suggested that the difference in b-values is due to subtle asymmetries in data processing procedures rather than differences in the physical environment before and after a large earthquake. GRA

N83-31160# National Academy of Sciences - National Research Council, Washington, D. C. Committee on Natural Disasters.
CENTRAL GREECE EARTHQUAKES OF FEBRUARY-MARCH 1981. A RECONNAISSANCE AND ENGINEERING REPORT
Panayotis G. Carydis (National Technical Univ.), Norman R. Tilford (Ebasco Services, Inc.), Gregg E. Brandow (Brandow and Johnston Assoc.), and James O. Jirsa (Texas Univ.) 1982 170 p refs Prepared in cooperation with Earthquake Engineering Research Inst., Berkeley, Calif.
(Grant NSF CEE-78-10631)
(PB83-171199; CETS-CND-018) Avail: NTIS HC A08/MF A01 CSCL 08K

An account of an earthquake in greese is given. At 10.57 pm (local time) on February 24, 1984, an earthquake with a Richter magnitude of 6.7 occurred in the region around the eastern Gulf of Corinth. Initial reports placed the epicenter of this event in the Gulf of Corinth about 70 km west of Athens and 20 km north-northeast of Corinth. A major aftershock with a Richter magnitude of 6.3 occurred at 4:36 am. on February 25. The 1981 surface ruptures occurred along existing faults and were exposed for 1 to 5 km. The man event produced effects on the modified Mercalli scale of intensity 8 within an estimated area of 1,400 sq km. The most heavily damaged areas from the major earthquake and the first aftershock were concentrated around the southeastern coast of the Gulf of Corinth about 10 to 20 km from the epicenter of the major event. Author (GRA)

N83-31161# National Academy of Sciences - National Research Council, Washington, D. C.
POLAR RESEARCH BOARD REPORT AND FUTURE PLANS Annual Report, Jan. - Dec. 1982
1983 55 p
(PB83-168815) Avail: NTIS HC A04/MF A01 CSCL 08L

Studies completed, work in progress, and projects planned for initiation are described. International activities related to the Board's role as U.S. National Committee for the Scientific Committee on Antarctic Research of the international Council of Scientific Unions, including in particular U.S. participation in the 17th Meeting of the Scientific Committee are also described. GRA

N83-31162# Sveriges Geologiska Undersoekning, Uppsala.
CARBONATE PETROGRAPHY OF THE WENLOCKLAN SLITE BEDS AT HAGANAES, GOTLAND

Bjoern Sundquist 1982 94 p refs
(PB83-167478; SGU-C-796) Avail: NTIS HC A05/MF A01 CSCL 08G

In the Wenlockian (middle Silurian) Slite Beds of Gotland, a sequence of 2.73 m has been petrographically and sedimentologically studied in detail. The sequence covers the transition from fine-grained, micritic and microsparitic, carbonate rocks with intercalations of calcareous shales and slity claystones (Slite Marl), to coarse-and very coarse-grained limestones with intercalations of calcareous shales and microsparitic carbonates. The analyses enable a lithologic four-partition of the sequence, and indicate that the depositional environments of these rocks were in the shallow subtidal-intertidal zones. Author (GRA)

N83-30462# Joint Publications Research Service, Arlington, Va.
GEOLOGICAL OBSERVATIONS BY SALYUT-7 COSMONAUTS
A. Pokrovskiy *In its* USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 70-72 Transl. into ENGLISH from Pravda (Moscow), 10 Jun. 1982 p 6 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N83-31163 Federal Aviation Administration, Atlantic City, N.J.
EIGHTH INTERNATIONAL AEROSPACE AND GROUND CONFERENCE ON LIGHTNING AND STATIC ELECTRICITY: LIGHTNING TECHNOLOGY ROUNDUP
Jun. 1983 846 p refs Conf. held in Fort Worth, Tex., 21-23 Jun. 1983; sponsored in part by Florida Inst. of Tech., IEEE, UK Civil Aviation Authority, and RAE Sponsored by National Interagency Coordination Group
(FAA-CT-83-25) Copyright. Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Lightning phenomonology, lightning characterization, modeling and simulation, test criteria and techniques, and protection of both airborne and ground systems were discussed. For individual titles, see N83-31164 through N83-31242.

N83-31164* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
STORM ELECTRICITY RESEARCH IN OKLAHOMA: AN OVERVIEW
W. David Rust (National Severe Storms Lab.), William L. Taylor (National Severe Storms Lab.), Donald R. MacGorman (National Severe Storms Lab.), Roy T. Arnold (Mississippi Univ., Oxford), Stephen J. Goodman, and Vladislav Mazur (Cooperative Inst. for Mesoscale Meteorological Studies, Norman, Okla.) *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 8 p refs Sponsored in part by ONR and NSF (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

The National Severe Storms Laboratory and other agencies and institutions have collaborated on storm studies in which electrical and meteorological phenomena are compared and individual lightning characteristics are studied. Lightning is usually associated with higher radar reflectivities from precipitation and often extends downwind from the main updraft into lowr reflectivities. Lightning activity appears to be distributed vertically with a bimodal distribution having peaks between about 4 to 6 and 11 to 13 km. The upper peak is in lower reflectivities and strongly associated with divergent winds at the top of the storm. Lightning of significant horizontal extent (tens of kilometers) appears to be common in Great Plains storms. In-cloud progression speeds vary during a flash with maximum speeds averaging about 100 km/s. Lightning flashes that lower positive charge to ground may pose unusual threats because they can occur in very weak reflectivities, tend to propagate long distances, usually contain continuing current, have fast risetimes during their return stroke, and appear to have very high peak currents. Author

N83-31165 Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
ATMOSPHERIC ELECTRICITY HAZARDS PROTECTION PROGRAM
Rudy C. Beavin, Jack R. Lippert, and Jayme E. Lavoie *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 10 p (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

The electromagnetic (EM) environment resulting from aircraft (A/C) interaction with atmospheric electricity (AE); e.g., lightning and precipitation static; will be define and the impact of the environment on electrical/electronic subsystems and equipment assessed. Tradeoffs will then be exercised to prescribe atmospheric electricity hazards protection (AEHP) concepts which are compatible with protection required against other EM threats. From the candidate protection concepts available, optimized AEHP schemes for various classes of vehicles; e.g., fighters, transports/bombers, helicopters, and missiles, is specified. The effectiveness of the protection provided will be demonstrated through ground based AE simulation utilizing full-scale A/C and operating electrical/electronic subsystems and equipment employing appropriate AEHP concepts. Timely information distribution and participation by interested organizations and personnel is emphasized. Author

N83-31166 Ford Aerospace and Communications Corp., Sunnyvale, Calif.
LIGHTNING PROBLEMS ENCOUNTERED IN LARGE ELECTRONICS INSTALLATIONS AND THEIR SOLUTION
Samuel R. Crawford *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 22 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

The deleterious effects of lightning discharges due to inter/intra-cloud discharge on large distributed electronics installations (observed over a number of years) range from momentary disruption in performance to catastrophic destruction of site components. A model is developed which gives ground level electric field intensity. The effects of this electric field on overhead power lines, including the influence of the soil characteristics on the effect of the lightning electromagnetic pulse (LEMP) is presented. The results of voltages induced in long cables by LEMP on the components of the installation is also discussed. A history of implementation procedures for distributed electronic installation and methods of mitigating these results are presented. Author

N83-31167* National Severe Storms Lab., Norman, Okla.
LIGHTNING ACTIVITY OBSERVED IN UPPER AND LOWER PORTIONS OF STORMS AND ITS RELATIONSHIP TO STORM STRUCTURE FROM VHF MAPPING AND DOPPLER RADAR
William L. Taylor, W. David Rust, Donald R. MacGorman, and Edward A. Brandes *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 9 p refs Sponsored in part by NASA (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Space time mapping of very high frequencies (VHF) sources reveals ightning processes for cloud to ground (CG) and for large intracloud (IC) flashes are confined to an altitude below about 10 km and closely associated with the central high reflectivity region of a storm. Another class of IC flashes was identified that produces a splattering of small sources within the main electrically active volume of a storm and also within a large divergent wind canopy at the top of a storm. There is no apparent temporal association between the small high altitude IC flashes occurring almost continuously and the large IC and CG flashes sporadically occurring in the lower portions of storms. Author

N83-31168* National Severe Storms Lab., Norman, Okla.
SOME SPATIAL AND TEMPORAL RELATIONSHIPS BETWEEN LIGHTNING AND STORM STRUCTURE AND EVOLUTION
D. R. MacGorman, W. L. Taylor, and A. A. Few (Rice Univ.) *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 7 p refs Sponsored in part by NASA and NSF (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

A number of systems were used to study relationships between lightning and other storm parameters. Instrumentation includes a system for locating cloud to ground lightning strike points, an acoustic lightning mapper and very high frequencies (VHF) (30 to 80 MHz) lightning mapper to study the structure and location of lightning, and S band radar to provide other storm data. Several characteristics of the reconstructed lightning have been relatively constant: (1) lightning structure is usually predominately horizontal; (2) lightning tends to occur preferrentially in certain altitude ranges that are only a few kilometers thick and above the O C isotherm; (3) it tends to occur near, but not necessarily inside, cores of high reflectivity (approximately or > 45 dBz), and it often connects with regions of relatively weak reflectivity downstream from stronger reflectivity and updraft cores. Other relationships are also discussed. Author

N83-31169 Hochschule der Bundeswehr, Hamburg (West Germany).
DAMAGE OF RFC SURFACE LAYERS BY ELECTROSTATIC CHARGING
D. Koenigstein *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 10 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Electrostatic charging of thin insulating superficial paint layers applied on the conductive structure, lightning or p-static protection system of aircraft parts can lead to mechanical damage due to electrical breakdown. For layers of less than approx. 0.25 mm thickness the effects can be tested on small samples of the interesting material. The energy of the discharge and consequently the resulting damage is increasing with: the breakdown field strength of the paint, the thickness of the unsulating layer, and the conductivity of the conductive layer next to the surface. In any case, there was little influence of a damaged point on the discharging or recharging process of the entire surface. The graphic presentation of charge distribution showed that only the nearest vicinity of a punctured hole remained uncharged. Author

N83-31170 SRI International Corp., Menlo Park, Calif.
RELATIVE IMPORTANCE OF ELECTROMAGNETIC SHIELD VIOLATIONS
W. Graf, J. M. Hamm, and E. F. Vance *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 8 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

In the topological approach to hardening systems against lightning, a barrier that is effectively impervious to electromagnetic energy is placed between the source of interference and the system to be protected. To be impervious, the barrier must form a topologically closed surface. The ideal barrier is never achieved in practice, but it is not necessary. The three categories of compromise are, in order to importance, penetrations, apertures, and diffusion. Diffusion is almost always negligible (unless the metal walls consist of foils), and wire penetrations are almost always by far the worst compromise. Thus, an otherwise excellent barrier may be compromised by one untreated penetration. Lightning, from an interference point of view, is a broadband electomagnetic phenomenon, and therefore practices that are adequate at low frequencies or dc is not satisfactory for lightning protection. The topological approach provides simple guidance to identify the compromises in an otherwise closed barrier. Author

N83-31171 SRI International Corp., Menlo Park, Calif.
TOPOLOGICAL GROUNDING ANOMALIES
W. Graf and J. E. Nanevicz *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 13 p (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Two principal anomalies found in current grounding practices are discussed: The ground conductor penetrating a shield, and a grounded but open shield. Good grounding practices are simple when viewed from the topological viewpoint. A system is divided into different zones, each separated from the other by an electromagnetically impervious barrier, and each zone has its own ground system. Because lightning is a broadband phenomenon, the separation of the zones must also be achieved over a broadband if a system is to be protected against the effects of lightning. The practice of connecting the signal reference ground to the Earth electrode has serious consequences (in the event of a lightning strike) for the equipment connected to it, unless the ground rod has zero impedance. In the topological approach, such a connection is only permitted if the grounding conductor does not penetrate the barrier surfaces that separate the different zones of the system. Author

N83-31172 Hochschule der Bundeswehr, Hamburg (West Germany).
PROTECTION AGAINST LIGHTNING SURGE VOLTAGES ON COMMUNICATION LINES AND POWER LINES c23
J. L. TerHaseborg and H. Trinks (Technische Univ., Hamburg) *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 6 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Sensitive electronic systems are shielded against electromagnetic interferences (lightning, electromagnetic pulses (EMP)). The shielding efficiency is reduced by field coupling through apertures and particularly by feeding of interfering currents through cable entries. In case these cables are connected to the inputs of electronic devices, the surge voltages may disturb or even destroy these devices or single electronic components, particularly semiconductors. Special passive protection circuits for communication and power lines against lightning and EMP induced surge voltages are developed. The edge steepnesses of the applying surge voltages show values of 2kV/us (lightning) up to 2kV/ns (EMP). Author

N83-31173 Indian Inst. of Tropical Meteorology, Poona.
FREQUENT FAILURE OF LIGHTNING ARRESTERS AT THE SATPURA THERMAL POWER STATION, INDIA: PRELIMINARY RESULTS OF FIELD OBSERVATIONS c33
A. Mary Selvan, G. K. Manohar, L. T. Khemani, P. C. S. Devara, G. A. Momin, A. S. R. Murty, and Bh. V. Ramana Murty *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 7 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

A new theory for the generation of static electricity in the atmosphere was proposed. The theory can explain the atmospheric electrical phenomena like intense electrification of dust storms, lightning activity associated with volcano erruptions and very high electric fields in plumes emitted from power plant stacks. Also, it has useful applications in the prediction and mapping of electric fields in the environment of space vehicle launching sites, super thermal power plants and explosive testing/storage sites. The failure of the lightning arresters is attributed to the fatigue caused by the continuous flow of surge currents through the arresters. When these currents exceed a critical value the resealing function of the arresters are affected resulting in their failure. Author

N83-31174* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

CORRELATED MEASUREMENTS OF UHF RADAR SIGNATURES, RF RADIATION, AND ELECTRIC FIELD CHANGES FROM LIGHTNING c32

D. M. LeVine and Vladislav Mazur (Oklahoma Univ., Norman) *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 11 p refs (For primary document see N83-31163 19-47)

(Contract NCC5-600)

Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

During Storm Hazards - 82, simultaneous measurements were made of radar echoes, fast and slow field changes and RF radiation from lightning near the Wallops Flight Facility. RF radiation and radar echoes were also obtained during periods when the NASA F106 research aircraft was struck by lightning. These data are presently being used to better understand the electrical processes which occur during strikes to the aircraft. Preliminary conclusions based on data obtained in 1982 verify that the events recorded aboard the aircraft occurred during lightning but also indicate that they occur with surprising frequency very early in the flash. Author

N83-31175 National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.

RELATIONSHIPS BETWEEN LIGHTNING OCCURRENCES AND RADAR ECHO CHARACTERISTICS IN SOUTH FLORIDA

Ronald L. Holle, Raul E. Lopez, and William L. Hiscox *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 9 p refs (For primary document see N83-31163 19-47)

Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Locations of cloud-ground lightning flashes were recorded during 1978 in south Florida; concurrently, radar data were digitized over a wide variety of meteorological conditions. Analyses show that a sharp difference exists between the frequency distributions of (1) radar cells (reflectivity maxima) associated with lightning flashes, which peaked at 46 dBz, and (2) cells without lightning, which peaked at 18 dBz. Similar results also apply for an area several kilometers around a flash, and indicate that only 20% of the radar data (above 30 dBz) accounted for nearly 70% of the collocated lightning. Other results specifying time relations, cell areas, and number of flashes are also described. Author

N83-31176 National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.

CLIMATOLOGICAL CHARACTERISTICS OF LIGHTNING OVER SOUTH FLORIDA AND THEIR CORRELATION WITH RADAR ACTIVITY

Raul E. Lopez, Ronald L. Holle, and William L. Hiscox *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 16 p refs (For primary document see N83-31163 19-47)

Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

The analysis of lightning, radar, and sounding data for two summer months in south Florida has shown that there is a relationship between the degree of cloud to ground flash activity during the day and certain combinations of meteorological parameters detected early in the morning before significant convection develops. In general, it appears that clouds tend to be better flash producers (per unit area) under conditions of suppression of convection and light winds. As the atmosphere becomes disturbed, the clouds (although greater in numbers) tend to be less intense in their lightning activity. Author

N83-31177 Syracuse Research Corp., N. Y.

MODELLING OF DIRECT-STRIKE LIGHTNING COUPLING BY A TRANSFER FUNCTION TECHNIQUE c06

D. T. Auckland, R. F. Wallenberg (Naval Air Systems Command), and J. A. Birken *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 9 p refs (For primary document see N83-31163 19-47)

Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

A transfer function approach is applied to the problem of lightning coupling into internal aircraft avionic circuits. This approach allows a systematic procedure for determining transient levels induced on interior aircraft circuits due to exterior interference fields such as those caused by nearby or direct strike lightning. Unique in the approach used here is the use of a triangular patch model for the exterior surface of the aircraft with all points of entry (POEs) closed. A moment method procedure is then used to find the 'short circuit' skin current in the frequency domain. This current interacts with all the POEs, described by either measured or theoretically calculated transfer functions, in a secondary interaction problem to create interior penetrating fields. These interior fields are used to derive distributed voltage and current sources which excite a transmission line model of a wire harness or cable bundle. Author

N83-31178 Texas Technological Univ., Lubbock. Dept. of Electrical Engineering.

SOME RESULTS AND LIMITATIONS OF PRONY ANALYSIS OF IN-FLIGHT LIGHTNING DATA c39

T. F. Trost, C. D. Turner, and C.-T. Wen *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 8 p refs (For primary document see N83-31163 19-47)

Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Recent results have shown that the electromagnetic resonances of an aircraft are excited by lightning. Each resonance is characterized by a particular frequency and damping rate, and these two quantities taken together constitute a "natural frequency". One way to determine the natural frequencies is by applying Prony analysis to waveforms measured during lightning strikes. This involves a numerical technique for fitting a series of damped sinusoids to the measured waveforms. Electric magnetic field waveforms recorded on the N.A.S.A. F-106B aircraft during lightning strikes were analyzed using the Prony technique. A number of natural frequencies were determined, and these are in substantial agreement with the frequencies observed on a laboratory model of the airplane. The process of determining the frequencies is not without difficulties, and some waveforms yield much better results than others. Author

N83-31179 Harris Corp., Melbourne, Fla.

A MODELING SYSTEM FOR CONDUCTED TRANSIENT ANALYSIS c33

Thomas L. Mahoney *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 10 p refs (For primary document see N83-31163 19-47)

Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

A computer simulation system was developed which facilitates the analysis of electrical/electronic systems. Power interface transient problems were investigated and the program is called the Navy Power Systems Simulator. The simulator is used as a system engineering tool which generates and processes models of virtually any electrical network. It is simple to use and capable of automatically producing a complex system's steady state or transient output response. An engineering friendly computer interface is achieved by the extensive use of interactive graphics and menu driven prompting. E.A.K.

N83-31180 Norton AFB Ballistic Missile Office, Calif. Lightning and Transients Research Inst.

LIGHTNING PROTECTION ZONES FOR ROCKET LAUNCH COMPLEXES c14

A. Murakami, K. R. Pinckney, and J. D. Robb *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 10 p refs (For primary document see N83-31163 19-47)

Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

The rolling ball theory of lightning protection zones was examined. The theory is supported in terms of the critical gradient time history for lightning rods as described mathematically in terms

of a prolate spheroid. It is shown that the critical threshold gradient for a sharp object lying below a lightning rod can emit a ground streamer which will move above the lightning rod before the critical gradient is reached on the taller rod. This occurs only if the radius of the lightning rod tip is substantially larger than the radius of objects lying within its zone of protection and this results in defeat of the rod. The use of the catenary cable protection system over launch complexes and the need for it is considered. E.A.K.

N83-31181 Sagami Inst. of Tech., Fujisawa (Japan).
RELATIONS OF THE FLASHOVER VOLTAGE VERSUS THE VELOCITY OF THE MOVING ELECTRODE c33
Y. Nagai, T. Koide, and K. Kinoshita *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 8 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

The velocity of the moving electrode effects on the flashover voltages between the stationary plane electrode and the moving electrode was shown. In the stationary electrode system, the space charges produced from the tip of the electrode distribute to relax the strength of the electric field at its point, which prevents the flashover. While the electrode is set in motion, it is difficult to suppress the development of the corona or streamer which leads to flashover, because the tip of the electrode moves always prior to the existing region of space charges. The lightning which is triggered easily by a moving aircraft or a launching rocket carrying a wire connected to the ground is explained. E.A.K.

N83-31182 Colorado Scientific Research Corp., Berthoud.
STATIC DISCHARGE AND TRIGGERED LIGHTNING
Heinz W. Kasemir *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 11 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

The mechanism of a lightning discharge which is analagous to a spark discharge between two metallic electrodes was examined. Charges are collected by the leader stroke from the negatively charged cloud volume and carried either to ground producing a ground discharge or to the positively charged cloud volume producing a cloud discharge. It is shown that all static discharges encountered on an aircraft are triggered lightning. Triggered lightning outnumbers by far the rather rare hit by natural lightning and warning devices, danger zones, are quite different for the two types of accidents. A controversey on charge and energy problems of static discharges is discussed. These problems center on the question: where does the lightning discharge obtain its charges to produce the measured currents or fields, if it is triggered far away from a thundercloud? The problems are resolved by the uncharged leader theory, it is explained that lightning does not have to collect charges from the environment be it a thunder cloud or a volume of clear air. The charges are generated in the lightning channel itself by ionization and then separated in the channel by the induction mechanism. E.A.K.

N83-31183* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
LABORATORY AND FIELD OBSERVATIONS RELATED TO ICE PARTICLE AND AIRCRAFT CHARGING IN CONVECTIVE STORMS
H. Christian, L. Lillie (Aerosystems, Inc., Erie, Colo.), C. P. R. Saunders (Manchester Univ., England), and J. Hallett (Desert Research Inst., Reno, Nev.) *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 8 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Graupel particle charging in simulated cloud conditions which show the need for the presence of ice crystals and cloud water simultaneously except under conditions where secondary ice crystal production occurs when charging initially occurs in the absence of ice crystals was examined. The magnitude of the charging increases with size of ice crystals, and impact velocity; it is also sensitive to impurities. The magnitude of the charge is also sensitive to temperature and the sign changes between -10 and -20 C, depending on cloud liquid water content. Aircraft studies were carried out in Montana convective clouds to test the validity of the extrapolation of the laboratory data to the atmosphere from the viewpoint of generation of charge, electric field, and aircraft charging during cloud penetration. E.A.K.

N83-31184 PRC Systems Services Co., Kennedy Space Center, Fla.
INSIDE THE CONE OF PROTECTION
J. R. Stahmann *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 7 p (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

The degree of hazard for a person required to be exposed to the lightning hazard in the vicinity of a tall structure was estimated. The concept of striking distance which provides a technique is discussed. It is evident that the probability does not vary suddenly at a particular distance from the tower, however, the probability of being struck does decrease rapidly as the tower is closely approached. From a safety point of view, the probability of any lightning strike to a group of persons is important. This hazard is increased by the number of people exposed. Reduction of the lightning strike hazards in the future is the ability to make specific predictions about the location of the thunderstorm charged regions and about the thunderstorm intensity and other characteristics that may be used to accurately predict the strike threat to personnel at specific locations. E.A.K.

N83-31185 Georgia Inst. of Tech., Atlanta.
EARTH ELECTRODES FOR GROUNDING NEMP TYPE LIGHTNING c33
David P. Millard *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 17 p refs (For primary document see N83-31163 19-47)
(Contract DNA001-80-C-0294)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

The properties of earth electrode systems over a frequency range covering the NEMP type lightning power spectrum were investigated. Since this power spectrum extends well into the VHF region, conventional low frequency and historic impulse measurement techniques are not adequate to describe the electrode system's response to NEMP type lightning. The development of a measurement technique that could be used was emphasized to both: (1) assess the performance of a given ground electrode; and (2) conduct a site survey to determine the best location for ground electrodes. The technique was used to evaluate the performance of various common ground electrode configurations. E.A.K.

N83-31186 Federal Emergency Management Agency, Denver, Colo.
IMPROVED GROUNDING SYSTEM FOR MOUNTAIN TOP RADIO SITES c33
Lloyd B. Watts *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 4 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

The use of bentonite (well drillers mud) when installing vertical ground rods was described. This concept was developed to use copper tubing a lateral trench (radial type ground) that has been backfilled with layers of bentonite. In the case of mountain top sites, it is usually possible, with machinery, to obtain a trench that is 200 mm to 600 mm deep. Several of these sites are over 3460 M and are getting a backhoe and dry bentonite to these locations was discussed. In addition to the radial ground, metal oxide varisotors (MOV), bipolar zeners and coax tee's are used to complete the protective scheme. E.A.K.

N83-31187 Nis Univ. (Yugoslavia). Faculty of Electronics.
ELECTRICAL RESISTIVITY OF CONCRETE IN THE FOUNDATION EARTH **c33**
Aleksandar Vorgucic *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 4 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

The electrical resistivity change of concrete in connection with different grounding was studied. The examinations are made under different conditions of moisture and combinations of electrodes. Even for a long period of time the concrete electrical resistivity increasis permanently. The electrical resistivity increasing of concrete at foundation earth could lead to decreasing of the effectivity of the grounding system. In industries, where static electricity appears, increasing resistivity of concrete floors could have influence in the technological processes. E.A.K.

N83-31188 Southwest Research Inst., San Antonio, Tex.
ELECTROSTATIC VOLTAGE SENSORS FOR HELICOPTER DISCHARGERS **c06**
Oren Tranbarger and Bob M. Duff *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 34 p refs (For primary document see N83-31163 19-47)
(Contract DAAK51-79-C-0060)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

To maintain hovering helicopters at safe energy levels, a noncontacting electrostatic sensor is required to accurately determine the voltage on the aircraft relative to ground and provide proper control data to an active discharger for neutralizing hazardous charging conditions. It is shown that a sphere suspended between tow electrified ground planes and surrounded by space results in a theoretical relationship which shows how charge density, excess surface charge, and external electric fields affect the voltage on the sphere. Helicopter charge equilibrium conditions are specified from the theoretical and empirical analyses together with a methodology for determining the elastostatic coefficients of full scale hovering helicopters. It is found that active electrostatic discharger systems are now feasible for helicopter applications. E.A.K.

N83-31189 Technische Univ., Hamburg (West Germany).
DETECTION AND RANGING OF ELECTRIC CHARGED HELICOPTERS **c05**
H. Trinks and J. L. terHaseborg (Hochschule der Bundeswehr, Hamburg) *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 8 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Helicopters are electrically charged during their flight. The electric charge generates an electric field in the helicopters' vicinity which can be measured. It is found that by such electric field measurements the detection and localization of flying helicopters is possible. Systematic investigations were performed for different types of helicopters flying over ground based electric field sensors. Supplementary electric field sensors were telemetric guided in the vicinity of hovering helicopters. The experimental results were compared with theoretical computations about electric field distributions of electric charged helicopters hovering near trees and buildings. E.A.K.

N83-31190 McDonnell Aircraft Co., St. Louis, Mo.
A REALISTIC APPROACH TO AIRCRAFT LIGHTNING PROTECTION **c03**
G. L. Weinstock *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 3 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

A probabilistic approach to the design of aircraft lightning protection which may be a useful method of avoiding conventional worst case design penalties is presented. The application of the specifications lightning protection to aircraft is made without consideration of mission, probability of strike occurrence, or penalties associated with protective designs. Data from recent in flight test programs, all show that the requirements may be too stringent and that a revision to the method of applying lightning specifications to aircraft may be justified. In conventional and V/STOL high-technology fighter aircraft, weight has a direct effect upon performance, combat effectiveness, losses, and life cycle cost. Unnecessarily stringent lightning protection requirements can add weight out of protection to the lightning risk. A systematic method of tailoring requirements to risk or damage probability is desirable to provide a more balanced protective design. E.A.K.

N83-31191 McDonnell-Douglas Technical Services Co., Inc., Houston, Tex.
CORRELATION OF SPACE SHUTTLE AS-BUILT ATMOSPHERIC CAPABILITIES WITH KNOWN ATMOSPHERIC CONDITIONS THAT PRODUCE LIGHTNING **c16**
Tim Fitzsimmons *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 12 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

The atmospheric flight capabilities of the Space Shuttle are summarized. These capabilities are limited by vehicle systems such as structures, tiles, and RF navigation. An analysis of the storm parameters, and the launch and landing profiles at Cape Kennedy (the primary landing site) are examined. Spark over field data for the Shuttle are calculated and coupled with electric field strengths found in Florida thunderstorm studies. Probabilities for encountering lightning strikes of varying magnitudes are proposed based on the above information and lightning amplitude statistics. E.A.K.

N83-31192 Boeing Military Airplane Development, Seattle, Wash.
ATMOSPHERIC ELECTRICITY THREAT DEFINITION FOR AIRCRAFT LIGHTNING PROTECTION **c03**
B. G. Melander *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 37 p refs (For primary document see N83-31163 19-47)
(Contract F33615-82-C-3406)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

A consistent atmospheric electricity (AE) threat environment for use in the protection of aircraft electronic/electrical systems is described. The definition evolved from measurements of direct strikes to aircraft and ground installations. The AE threat definition includes threats of two basic types: (1) all lightning associated threats; and (2) static electrification threats. Cloud to ground lightning was studied and is used as the basis for the present lightning threat definition. The defined threat is compared to available cloud to ground lightning strike data. Intracloud discharges, are usually less severe. Characterization of static electrification including streamers and corona are included in the total atmospheric electricity threat. Static electrification is caused by both tribo electric and exogeneous charging which creates both corona and streamers. The threat includes the best currently available data for both lightning and static charging phenomena. The threat definition will ultimately be used to define future protection and qualification requirements. E.A.K.

N83-31193 Bundesamt fuer Wehrtechnik und Beschaffung, Koblenz (West Germany).
LIGHTNING STRIKES TO AIRCRAFT OF THE GERMAN FEDERAL ARMED FORCES **c03**
Wilfried Ziegler *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 8 p ref (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Lightning strikes to aircraft of the Federal Armed Forces from 1973 until 1982 were surveyed. About 80% of the lightning strikes involved the following 4types of aircraft: F-104 G Star-fighter,

F-4 Phantom, C-160 Transall, BR-1150 Breguet Atlantic. The annual rates of lightning strikes as well and the average rates over these 10 years are shown. The main locations at which lightning attached to the aircraft and damage sustained are described. Two lightning strikes are discussed. Problems that are expected to result from the greater use of CFC for the airframe, the increasing employment of computers, and the electrical transmission of essential control signals are discussed. E.A.K.

N83-31194 Lightning Technologies, Inc., Pittsfield, Mass.
RECENT LIGHTNING INDUCED VOLTAGE TEST TECHNIQUE INVESTIGATIONS **c33**
Keith E. Crouch *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 19 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Lightning induced voltage testing techniques are discussed. The cause/effect relationships associated with technique procedures which generate a better understanding of test circuit behavior was investigated. The travelling waves propagate in a transverse electromagnetic (TEM) mode at the speed of light. However, due to reflections and refractions at the junctions of different impedance sections of the aircraft (i.e., wing and tail attachments) the bulk of the wave energy travels distances considerably farther than the nose to tail dimension. Consequently, the wave appears to take longer to reach the tail, which is interpreted as a slower propagation velocity. Travelling electromagnetic waves reflecting and refracting on the aircraft transmission lines control the response of the system during the initial few microseconds of the test. The system itself will govern the current risetime which can be injected due to the reflection/refractions and the low pass filter characteristics of the system. With configurations, current risetimes faster than 100ns do not appear possible. E.A.K.

N83-31195* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
NASA F-106B LIGHTNING GROUND TESTS **c03**
B. D. Heady (McDonnell Aircraft Co.) and K. S. Zeisel (McDonnell Aircraft Co.) *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 7 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Lightning simulation ground tests conducted on the NASA F-106B research aircraft to elicit natural strikes are summarized. The purpose of the test program was to measure the response of the aircraft's electromagnetic sensors and interior wire circuits to a controlled ground test environment that simulates the electromagnetic effects of a lightning strike. Both direct attachment and radiated field tests were conducted. In most cases, the aircraft's engine was running and test data were gathered simultaneously from NASA and MCAIR sensors on both the aircraft's own instrumentation system and the remote MCAIR computer-controlled data acquisition system. During the direct attachment tests, the input inductance, output condition (hard-wired or spark gap), and the output location were varied to provide a wide variety of test conditions. Author

N83-31196 Royal Aircraft Establishment, Farnborough (England).
INDUCED TRANSIENTS IN A SIMULATED LIGHTNING TEST OF THE FLY-BY-WIRE JAGUAR AIRCRAFT **c03**
R. H. Evans and J. Bishop *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 14 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Simulated lightning tests were performed on the Jaguar aircraft modified for demonstrating fly-by-wire technology. A pulse generator injected currents of 100 kA maximum into the fuselage; measurements were made of induced voltage and current transients in cables, currents and magnetic fields in equipment bays, current density on the fuselage and wings, and rate of change of electrical field at two locations. Full-threat estimates were obtained by extrapolation. Some remarks are included on the consistency and accuracy of the results and their realism in relation to actual in-flight strikes. Author

N83-31197 Rice Univ., Houston, Tex. Dept. of Space Physics and Astronomy.
INTRACLOUD LIGHTNING STREAMER MODELING BASED UPON IN SITU BALLOON MEASUREMENTS
G. J. Byrne, A. A. Few, M. E. Weber, and M. F. Stewart *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 7 p refs (For primary document see N83-31163 19-47)
(Contract N00014-75-C-0139; Grant NSF ATM-80-16164)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Intracloud lightning streamers were modeled from balloon borne electric field change measurements and acoustic reconstructions of the lightning channel to approximate the streamer path. The simple model assumes the streamers extend along a straight line with constant velocity and uniform line charge concentration. Positive and negative polarity streamers were measured with an average velocity and line charge concentration of 5.3 x 100000/ms and 6.7 x, 01/cm, respectively. A lightning struck balloon measured field changes associated with the positive propagating streamer that coupled to the conducting balloon skin. The first results of these measurements are presented. The model for this streamer based on the balloon data is incomplete at the time of this writing. Author

N83-31198 Roorkee Univ. (India). Dept. of Physics.
PROPAGATION OF DISCHARGE CHANNEL INSIDE THE CLOUD
P. P. Pathak, J. Rai, and N. C. Varshneya *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 5 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

A mechanism for propagation of discharge channel inside the cloud is proposed. The mechanism is based on the motion of charged streamers under the combined influence of cloud-electric field and geomagnetic field. The mechanism gives a theoretical explanation of various experimental observations that most intracloud discharges and incloud portions of ground discharge are oriented roughly horizontally and are aligned always in the same direction. Author

N83-31199 Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
ELECTROMAGNETIC MEASUREMENTS OF LIGHTNING ATTACHMENT TO AIRCRAFT **c32**
P. L. Rustan, B. P. Kuhlman, J. Shovalter, and J. Reazer (Technology/Scientific Services) *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 8 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

A NOAA WC-130 aircraft instrumented with electromagnetic field sensors was flown in South Florida in close proximity to thunderstorms in the summer of 1981. Electromagnetic field measurements of two direct lightning attachments to the aircraft were recorded in a continuous analog recorder with a frequency response of 2 MHz on 17 July and 26 Aug. The 17 July flash lasted 295 msec and was characterized by about 200 individual pulses with a maximum pulse repetition rate of 1000 pulses/sec. The maximum uniform current of any of the isolated pulses was 650 Amperes. The rise-times of these pulses ranged from less than 350 nsec to about 12 mu-sec. Author

N83-31200 Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
AIRBORNE MEASUREMENTS OF THE RISETIMES IN LIGHT-

NING RETURN STROKE FIELDS

P. L. Rustan, B. P. Kuhlman, G. DuBro, and J. Reazer (Technology/Scientific Services) *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 5 p refs (For primary document see N83-31163 19-47)

Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

A WC-130 aircraft instrumented with electromagnetic field sensors was flown in South Florida in close proximity to thunderstorms. Electric and magnetic fields were measured over one thousand lightning return strokes at distances between 4 and 35 km from the aircraft. These field waveforms were recorded with a Digital Transient Recorder with a 25 MHz band-width which consists of 8192 samples in 20 nsec intervals. The risetimes for over two hundred return stroke magnetic fields have been calculated. The average risetime (10% to 90%) of the entire waveform for the first return stroke was 1.78 mu-sec with a standard deviation of .87 mu-sec. Author

N83-31201 Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.

LIGHTNING FIELD SPECTRA OBTAINED FROM AIRBORNE MEASUREMENTS

B. P. Kuhlman, J. S. Reazer (Technology/Scientific Services, Inc.), W. P. Geren (Boeing Military Airplane Co.), and P. L. Rustan (AFIT) *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 8 p refs (For primary document see N83-31163 19-47)

Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

A WC-130 aircraft was used as an airborne platform for broadband electric and magnetic field sensors to measure the surface fields on the airframe from lightning strikes in the 7 - 35 km range. The waveforms were recorded digitally, with a sample interval of 20 nsec and a time window of 164 microseconds. Since the aircraft was above 15,000 feet, and the lightning source was relatively nearby, the effects of ground propagation were minimized. Spectral have been obtained for the stepped leader, first return stroke, and subsequent return stroke over the frequency range 100 kHz to 20 MHz. These spectra are compared to published data of lightning field spectra obtained from ground-based measurements. With airframe resonances and field enhancement effects removed, the data have two primary applications: (1) to add to the data base for the nearly lightning strike threat; (2) to infer characteristics of the stepped leader, first return stroke, and subsequent return stroke processes. Recommendations for these applications are presented. Author

N83-31202 Federal Aviation Administration, Atlantic City, N.J.

GROUND EVALUATION OF AN AIRBORNE LIGHTNING LOCATOR SYSTEM

William Lewis, Anthony J. Barile, and Nickolus O. Rasch *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 7 p refs (For primary document see N83-31163 19-47)

Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

In a ground evaluation of an airborne lightning locator system, lightning stroke rates per 4 minutes were compared with aircraft turbulence during thunderstorm penetrations. Data were taken on 3 thunderstorm days and summarized mostly into 15-minute periods consisting of three to four aircraft penetrations. Stroke rates varied considerably and did not show a linear relationship to aircraft turbulence. However, when average stroke rates for the 15-minute periods increased, aircraft turbulence increased and vice versa. It is concluded that the lightning locator system is a potentially useful thunderstorm turbulence warning device, but requires further ground/air testing. Author

N83-31203 Naval Air Development Center, Warminster, Pa.

A WIDEBAND AIRBORNE/GROUND LIGHTNING FLASH LOCATION SYSTEM

Ernest Coleman *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 6 p refs (For primary document see N83-31163 19-47)

Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

The design and summary of test results of a new wideband lightning location system are presented. The design and performance of the subject system is identical for both airborne and ground applications. The unique method used for identifying, direction-finding and ranging to a lightning stroke is discussed. The lightning location system is designed to detect severe storms and to identify potentially turbulent weather. A standard video display output shows the location of thunderstorms by displaying the rate of lightning stroke activity. As new lightning strokes are received, the display intensifies on the CRT to show the center of the electrical activity. This provides a display of severe electrical storms similiar to the standard radar reflectivity displays. The lightning stroke data is integrated for four minutes. As the number of lightning strokes diminishes, the display decreases in brightness. A standard serial interface provides remote control and monitor capability. For the ground and airborne test programs, the serial channel is used to record all lightning data on a magnetic tape for later retrieval and display. Author

N83-31204 Lightning Location and Protection, Inc., Tucson, Ariz.

WIDEBAND MAGNETIC DIRECTION FINDER NETWORKS FOR LOCATING CLOUD-TO-GROUND LIGHTNING

R. C. Binford, L. G. Byerley, E. P. Krider, M. W. Maier, A. E. Pifer, and M. A. Uman *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 14 p refs (For primary document see N83-31163 19-47)

Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Extensive networks of lightning direction finding stations are now operating in the United States, Canada, Mexico, Norway, Sweden, South Africa, Australia, Japan, and the People's Republic of China. These systems are being used to determine the location, movement, and intensity of thunderstorms; to facilitate the early detection of lightning-caused fires; to determine whether electric power outages are lightning-caused; to warn of impending lightning hazards; and for a number of other applications and basic research. Here we describe the principles of operation of these lightning locating systems, system capabilities, typical system configurations, and system performance factors. Author

N83-31205 Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.

AIRBORNE AND GROUND-BASED LIGHTNING ELECTRIC AND MAGNETIC FIELDS AND VHF SOURCE LOCATIONS FOR A TWO-STROKE GROUND FLASH

M. A. Uman, E. P. Krider, P. L. Rustan, B. P. Kuhlman, J. P. Moreau, E. M. Thomson, J. W. Stone, Jr., and W. H. Beasley *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 8 p refs Prepared in cooperation Lightning Location and Protection, Inc., Tucson, Ariz. and Florida Univ., Gainesville (For primary document see N83-31163 19-47) (Contract F33615-79-K-0177)

Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

The data from a two-stroke lightning flash to ground which occurred in South Florida on July 16, 1981, within a network of four ground stations instrumented for VHF measurements, about 15 km from a ground station instrumented for wide-band electric field measurements, and within 10 km of a WC-130 aircraft operating at 5.2 km and instrumented for wide-band electric and magnetic field measurements are analyzed. The four-station ground-based VHF measurements allow a reconstruction of the geometry of the flash, which was composed of two separate channels to ground. Electric field system bandwidth for the ground measurement was from 0.02 Hz to about 2 MHz; electric and magnetic field system bandwidths on the aircraft extended to 20 MHz. Ground-based and airborne measurements of fields are presented and shown to be consistent with one another. Author

N83-31206* National Aeronautics and Space Administration. Wallops Flight Center, Wallops Island, Va.
LIGHTNING FLASH DENSITY VERSUS ALTITUDE AND STORM STRUCTURE FROM OBSERVATIONS WITH UHF- AND S-BAND RADARS
Vladislav Mazur (Oklahoma Univ.), John C. Gerlach, and W. David Rust (National Severe Storms Lab.) *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 3 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

The UHF-(70.5 cm wavelength) and S-band (10 cm wavelength) radar at NASA/Wallops Island Research Facility in Virginia, U.S.A. have been used to relate lightning activity with altitude and with reflectivity structure of thunderstorms. Two centers of lightning flash density were found; one between 6 and 8 km altitude and another between 11 and 15 km. Author

N83-31207 Syracuse Research Corp., N. Y.
THE EFFECTS OF NEW TECHNOLOGY TRENDS ON AIRCRAFT LIGHTNING VULNERABILITY AND THE CAPABILITY TO IDENTIFY TECHNOLOGY DEFICIENCIES c03
D. T. Auckland, R. F. Wallenberg, and J. A. Birken (Naval Air Systems Command) *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 9 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Operational aircraft representing the 1960 and 1970 technology time frames were tested in the Full-Level Lightning Aircraft System Hardening (FLLASH) program at Albuquerque, New Mexico, during the spring and summer of 1982. The direct-strike lightning threat was simulated and peak injection currents of 180 kA were achieved. A method was developed during this program which enables the aircraft designer to perform trade-off studies at very early design stages involving avionics packages, airframe configurations, and various threat scenarios. Author

N83-31208 Syracuse Research Corp., N. Y.
UNPROTECTED RADOME LIGHTNING TESTS AND IMPLICATIONS TO KEVLAR AIRFRAME DESIGNS c03
D. T. Auckland and J. A. Birken (Naval Air System Command) *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 6 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

A fiberglass radome, mounted on an operational aircraft, was subjected to a direct lightning strike attachment experiment. It was found that lightning diverter strips could be effectively used to prevent damage from occurring to the radome. Omission of any protective scheme, however, resulted in burnthrough of the radome surface and arcing to the edge of the phased array radar antenna. These test results are discussed in context with the application of nonconducting composite materials, such as Kevlar, to airframe component design. Author

N83-31209 Parker (Lee W.), Inc., Concord, Mass.
ERRORS IN LIGHTNING DIRECTION FINDING BY AIRBORNE CROSSED LOOPS
Lee W. Parker *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 16 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Analytical and computer approaches are presented for predicting the site errors of airborne crossed loops used for lightning direction-finding. This type of azimuth error is caused by distortion of the incident field due to induced skin currents. Computer code results are presented for a T-39 and a C-130 aircraft used in flight-testing a commercial crossed-loop system. Another type of bearing error, caused by non-vertical lightning channels, is analyzed for the case where both detector and lightning source are above a conducting ground plane. Also discussed is the 180-degree ambiguity and its resolution by an electric field antenna. Author

N83-31210 Naval Research Lab., Washington, D. C.
ELECTROSTATIC THEORY APPLIED TO HELICOPTER DISCHARGING c03
Robert V. Anderson *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 8 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

An electrostatic analysis is made of a hovering vehicle out of electrical contact with the ground. Charging of the vehicle is seen to be accomplished by a variety of mechanisms. Engine exhausts are strongly ionized; and, since they are physically localized at the stack(s), can be modulated to produce vehicle charging. Strong charging can result from the frictional contact of dust, ice, or water particles with the vehicle skin; and the processes of conduction and diffusion will operate to remove net charge from any isolated object. The electrostatics of an isolated body above a ground plane are reviewed and developed. Expressions are presented for charge, potential difference, and current. Typical physical situations are applied to allow presentation of meaningful examples. The theory and practice of net charge control as applied to an isolated body are briefly reviewed, and it is shown that discharge impulses upon initial contact cannot be eliminated by any system contained solely within an isolated vehicle. Author

N83-31211 Westland Helicopters Ltd., Yeovil (England).
ADVANCED TESTING OF LIGHTNING PROTECTION SCHEMES FOR COMPOSITE MAIN ROTOR BLADES (HELICOPTER) c03
M. J. Heseltine *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 9 p ref (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

The choice of composites, with their structural and aerodynamic advantages, for helicopter main rotor blades is briefly discussed along with some of the difficulties associated with their design, manufacturing and testing. The necessity for lightning and erosion protection for the blade's leading edge and the desire for early evaluation of projected design schemes are addressed. Attention is drawn to the lengthy lead time between the designing of a blade and the arrival of suitable, expensive tooling required to examine an actual blade specimen. A technique was developed which satisfies both the designer and the accountant. A blade is imagined to be cut, spanwise, from root to tip through the trailing edge and spar rearwall. The blade is then opened out like a book. If care is taken with the manufacture of the flat test specimen various lightning protection schemes can be evaluated well in advance of prototype blade specimens. A selection of protection schemes and the effect of varying the engineering tolerances of erosion shield assembly and the extent of damage so caused. The information gained through this work enabled blade design to be finalized well before actual blade specimens became available for test. Testing showed close correlation to the results of their flat counterparts. M.G.

N83-31212 United Kingdom Atomic Energy Authority, Abingdon (England).
NANOSECOND RESOLUTION OF DOT-E, DOT-H, AND DOT-I IN AIRCRAFT LIGHTNING TEST RIGS c35
B. J. C. Burrows *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 9 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Many designs of test rig have emerged in recent years incorporating hardwired connections and design incorporating series open arcs at each end of the aircraft. Important characteristics of the test rigs are not specified, but these characteristics control the generation of large (and usually HF) transients through the fast coupling processes. Both lumped element and distributed

element representation of these test rigs and the capacitor banks driving them are given, and the effects of parameter and geometry variations are highlighted. It is shown that quantitative analysis of fast transients (dot-D, dot-B) requires much closer specification of the test rig performance including switch closure time, capacitor bank and connecting line inductance, and the transmission line impedance of the test rig. Tests on the Fly-by-Wire Jaguar at Warton near Preston in England showed the need for developing a quantitative relationship between HF transients and the fast coupling processes. M.G.

N83-31213 Sandia Labs., Albuquerque, N. Mex.
FULL-SYSTEM TESTS USING THE SANDIA LIGHTNING SIMULATOR c09
Robert A. White *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 17 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Direct-stroke, very high-level natural lightning is simulated with a developmental lightning simulator, which has been used to apply fast-rising, high-current, high-energy outputs to full-scale operational systems. Samples of the wide range in output capabilities of this high-voltage, multiple-pulse simulator are described. Circuit considerations related to its use for testing physically large test items are discussed. The simulator is primarily used for conducting internal Sandia National Laboratories test programs, but example waveforms from direct-strike lightning simulation tests made for the Navy with functional F-14 and F/A-18 aircraft are also presented. Author

N83-31214 Aeronautical Systems Div., Wright-Patterson AFB, Ohio.
LIGHTNING INTERACTION WITH USAF AIRCRAFT c03
John C. Corbin *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 6 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Data from 877 USAF aircraft lightning-related mishap reports involving 56 aircraft types over a 13-year period (1970 to 1982) are categorized and analyzed. Aircraft are grouped into six general classes: attack, bomber, cargo, fighter, trainer, and helicopter. Data are tabulated under two major headings: operational conditions at the time of the lightning strike, and the effects of the strike. Operational conditions include aircraft attitude, aircraft altitude, outside air temperature, aircraft location (with respect to clouds), precipitation/turbulence, and electrical activity prior to the strike. Effects of the strike include attachment point, interference/outage, effect on mission, effect on personnel, structural damage, electrical/electronic damage, and repair/replacement costs. Interference/outage in the form of an abnormal condition observed following a strike was experienced in 20 percent of the reported lightning incidents. Aircraft was affected in 37 percent of the reported incidents, but in most cases where lightning caused a precautionary abort subsequent ground inspection of the aircraft revealed only minor structural damage. Structural damage was experienced in 78 percent of the reported incidents. Electrical/electronic damage was sustained in 8 percent of the reported incidents. M.G.

N83-31215 Rockwell International Corp., Anaheim, Calif. Autonetics Strategic Systems Div.
USAGE OF THE SYSCAP II CIRCUIT ANALYSIS PROGRAM TO DETERMINE SEMICONDUCTOR FAILURE THRESHOLD LEVELS CAUSED BY LIGHTNING/EMP TRANSIENTS c33
D. L. Rusher and C. T. Kleiner *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 6 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

An improved technique for calculating semiconductor junction heating resulting from arbitrary time-varying source terms is described. A FORTRAN subroutine is developed which permits solution of the convolution integral in the SYSCAP circuit analysis program which will simulate the thermal transient for each semiconductor of interest in a circuit subject to lightning/electromagnetic pulses disturbances. An example circuit is used to demonstrate the techniques; the results compare favorably with laboratory test data. M.G.

N83-31216 Arizona Univ., Tucson. Inst. of Atmospheric Physics.
THE SUBMICROSECOND STRUCTURE OF LIGHTNING RADIATION FIELDS
Philip Krider and E. D. Weidman *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 8 p refs (For primary document see N83-31163 19-47)
(Contract N00014-81-K-0175)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

The electromagnetic fields radiated by the preliminary cloud breakdown, leader steps, and the return strokes in cloud-to-ground lightning all exhibit large submicrosecond variations. Values of the maximum dE/dt during return strokes range from 7 to 76 V/m/us, when range-normalized to 100 km, with a mean and standard deviation of 33 + or - 14 V/m/us. If this return stroke field is produced by a single current pulse propagating upward at a speed of 10 to the 8th power ms, then the above values of dE/dt imply that the maximum dI/dt ranges from 35 to 355 kA/us with a mean of 154 + or - 70 kA/us. Leader steps just above the ground and the fast components of large cloud pulses produce dE/dt signatures that are often surprisingly similar to those from return strokes. Author

N83-31217* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A SOLUTION FOR THE ELECTROMAGNETIC FIELDS CLOSE TO A LIGHTNING DISCHARGE c32
D. M. LeVine and R. Meneghini *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 10 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

A solution is presented for the electromagnetic fields produced by a current pulse propagating along a filamentary path apropos of lightning return strokes. This solution includes the effects of charge transfer by the pulse. It is obtained following traditional procedures but modifying the electric scalar potential to insure conservation of charge at the filament's ends and employing a relativistically correct relationship between charge and current. Conventional solutions can be obtained from this solution by employing conservation of charge to rewrite it in terms of current only; however, this form has computational advantages over other formulations very close to the channel. Author

N83-31218 Centre National d'Etudes des Telecommunications, Lannion (France).
TROPICAL LIGHTNING: ELECTROMAGNETIC CHARACTERIZATION C.O.P.T. 81 EXPERIMENT (TROPICAL DEEP CONVECTION) c32
C. Leteinturier, J. Hamelin, and M. LeBoulch *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 12 p refs Sponsored in part by ONERA (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Electromagnetic measurements obtained as part of the COPT (convection profonde tropicale) experiment are presented and discussed. Two analysis methods were employed: a time domain analysis, which allowed the characterization of radiated signals from lightning return strokes and those emitted by intra-cloud discharges; and a harmonic analysis, used to determine the instantaneous spectrum evolution during the different lightning phases. Both wide and narrow band RF measurements are examined. M.G.

N83-31219 Mission Research Corp., Albuquerque, N. Mex.
THE EFFECT OF PROPAGATION ON ELECTROMAGNETIC FIELDS RADIATED BY LIGHTNING **c32**
Louis Baker and Robert L. Gardner *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 4 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

The model of Gardner is used to study the attenuation of lightning fields with distance over a variety of propagation paths. The lightning channel may consist of an arbitrary arrangement of linear segments, each with a different propagation velocity. The effects of an imperfectly conducting, anisotropic ionosphere and a lower surface of earth or water (including sea state) are studied. M.G.

N83-31220 Sandia Labs., Albuquerque, N. Mex.
PERFORMANCE OF THE SANDIA LIGHTNING SIMULATOR DURING F-14A AND F/A-18 AIRCRAFT LIGHTNING TESTS **c03**
Ronald I. Ewing *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 4 p (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Two Navy aircraft (F-14A and F/A-18) were subjected to high level lightning tests using the Sandia Lightning Simulator. The peak pulse currents applied were varied from 9 to 170 kiloamperes. The nominal rise time to peak was 2 microseconds. Double pulse and continuing currents were also applied. Several high current, high voltage pulses were also obtained. Ninety-six test pulses were applied to the F-14A and sixty-four pulses were applied to the F/A-18. Approximately eighty percent of these pulses met the test specifications and essentially all pulses produced useful data. Author

N83-31221 Haefely (Emile) and Co. Ltd., Basel (Switzerland).
AN IMPULSE GENERATOR TO SIMULATE LIGHTNING EFFECTS ON AIRCRAFT **c03**
E. Gockenbach, M. Modrusan, and H. Sutter *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 11 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Lightning flashes mainly differ in current amplitude, in the transferred charge, and the impulse shapes of the lightning current. A mobile impulse generator was developed for the simulation of the lightning flash characteristics. The main parameter of this newly developed lightning current simulator is the possibility of simulations the different waveforms of the indirect current effects with one test equipment. It can produce unipolar currents up to 50 kA with a rate of rise of 35 kA/us for at least 1,0 us. With the same equipment oscillating current waves can be simulated with peak values up to 120 kA or at frequencies of roughly 40 kHz or few kA at frequencies up to 130 kHz. Furthermore, an optimal combination of test sets is presented to simulate the direct current effects. M.G.

N83-31222 Lightning and Transients Research Inst., St. Paul, Minn.
MEASUREMENTS AND THEORETICAL ANALYSIS OF A FULL SCALE NEMP **c03**
J. D. Robb and R. A. Perala (Electro Magnetic Associates) *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 12 p refs Sponsored in part by AFWAL (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

In an earlier investigation, it was suggested that peaking capacitors are used in nuclear electromagnetic pulse simulators to supply the fast current rise times indicated by research in the field of lightning spherics and lightning strikes to aircraft. A more quantitative experimental and anaytical study was undertaken to examine the feasibility and the significant parameters for such a system. The results of the studies indicate that average lightning currents of 20,000 to 40,000 amperes with moderately fast rise times of 100 nanoseconds can be achieved fairly economically, but that rise times of the order of 30 to 50 nanoseconds would increase the cost and design difficulties significantly. What remains to be determined is the statistical distribution of currents and risetimes in strikes to aircraft. A number of flight research programs are underway which are accumulating data for establishment of new rise time test standards. M.G.

N83-31223 McDonnell Aircraft Co., St. Louis, Mo.
UPDATING THE MCAIR LIGHTNING SIMULATION LABORATORY **c09**
E. H. Schulte *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 9 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

The goal of lightning simulation testing of aircraft is to ensure flight safety. The realism of each simulation is limited by the complexities of both the lightning environment and the aircraft itself. As the natural threat becomes better understood and improved test techniques are developed, the modern lightning laboratory must continually upgrade its equipment and facilities to meet the need for more accurate test simulation. The major test improvements incorporated in the McDonnell Aircraft Company (MCAIR) lightning laboratory are described. Author

N83-31224 Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
VULNERABILITY ASSESSMENT OF ELECTRICAL/ELECTRONIC SUBSYSTEMS AND EQUIPMENT TO ATMOSPHERIC ELECTRICITY **c03**
Jack R. Lippert *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 8 p (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

During phase 1 of the Atmospheric Electricity Hazards Protection (AEHP) Program, the sensitivity of several generic classes of electrical/electronic subsystems and equipment will be assessed to electrical/electromagnetic threats associated with atmospheric electricity; e.g., lightning and precipitation static generated currents, fields, and potentials. This will be accomplished through the utilization of appropriate atmospheric electricity simulation and various test vehicles for flight/mission critical subsystem/equipment evaluation for operation in atmospheric electricity generated electrical/electromagnetic environments. Simulation techniques contemplated for use on this task as well as specification of the environmental parameters to be simulated are discussed. In addition, the testbeds planned to be used, including advanced composite skin modifications, are identified. Author

N83-31225 Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.
MONITORS FOR UPSET DETECTION IN COMPUTER SYSTEMS **c60**
M. E. Schmid, R. L. Trapp, G. M. Masson (Johns Hopkins Univ.), and A. E. Davidoff *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 15 p refs (For primary document see N83-31163 19-47)
(Contract N00024-81-C-5301)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

An upset is a deviation of system performance based on apriori knowledge of the system application task. Upset in computer systems are addressed with reference to two series of fault injection experiments on a representative microprocessor-based system. In the first series, the system executes a small machine language program; in the second series, a much larger software environment consisting of a Pascal interpreter running a general

applications program is used. For each case, a broad spectrum of fault conditions is utilized for the fault injections. An extensive instrumentation complex was developed to record microevent data associated with the upsets resulting from the injections. M.G.

N83-31226 Les Cables de Lyon, Bezons (France). Div. H.F.
LIGHTNING PROTECTION DEVICES FOR HIGH FREQUENCIES EQUIPMENTS c33
Jean Pierre Simi *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 9 p (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Lightning grounding devices, grounding, and decoupling strategies for high frequency equipment are discussed. Antenna, feeder, and equipment couplings are examined. M.G.

N83-31227 Southwest Research Inst., San Antonio, Tex.
DEVELOPMENT OF A HUMAN ELECTROSTATIC DISCHARGE MODEL IN RELATION TO ELECTRONIC SYSTEMS c52
William W. Byrne *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 20 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Electrostatic Discharge (ESD) is discussed as it pertains to understanding the processes of electrical charge buildup on a human being or other conductive shape, followed by a discharge into another conductor such as an electronic device. Several megawatts of peak power may be involved. In order to design and test for ESD, it is necessary to establish the electrical characteristics of the electrostatic buildup and discharge circuit. Crude models of a human being/electronic equipment system for ESD were developed. The modeling process was further developed to include a large metallic ground plane, under the facility floor covering, connected to Earth. Also, the effects of hand-held sharp radii metallic objects are examined. From the circuit parameters, approximate wave shapes of the discharge are computed for various cases. R.J.F.

N83-31228 Tokyo Univ. (Japan). Inst. of Industrial Science.
FAST FIELD CHANGES PRODUCED BY POSITIVE GROUND STROKES c33
Masaru Ishii, Junichi Hojo, Tatsuo Kawamura, and Kazuo Fujikake (Tohoku Electric Power Co. Inc.) *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 7 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Fast electric and magnetic field changes produced by positive ground strokes in Japan were recorded with the output of a slow antenna. High rate of positive ground flashes was recorded not only in winter but also in spring, and the fraction of positive ground flashes in a storm was known to correlate with the radar echo top instead of the vertical wind shear. The characteristics of the wave shape of the fast field changes of a positive ground flash and the difference from that of a negative ground stroke is stated, and the possible causes are discussed. Author

N83-31229 Nagoya Univ., Toyokawa (Japan). The Research Inst. of Atmospherics.
ON THE OSCILLATING BIPOLAR RETURN STROKE CURRENT c33
Tosio Takeuti, Nobuyuki Takagi, and Minoru Nakano *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 11 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Oscillating bipolar field changes due to nearby lightning return strokes (up to 25 km distance) were sometimes recorded during winter thunderstorms in Japan together with ordinary unipolar field changes as recorded in summer thunderstorms. In order to understand the reason for the appearance of an oscillating field change, the return stroke current along a lightning channel with a transmission line model was calculated. The calculation shows that the return stroke current oscillates because of the relatively small volume of the winter thundercloud. R.J.F.

N83-31230 Boeing Commercial Airplane Co., Seattle, Wash.
P-STATIC FLIGHT EVALUATION OF A LARGE JET AIRCRAFT c03
Charles H. King *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 43 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

The use of static dischargers to reduce P-static interference in radios is universal in large modern aircraft. These devices, although they quietly discharge the aircraft, represent drag and weight penalties and can delay dispatch of a flight if discharges at key locations are missing. Flight tests were conducted on a modern jet transport to determine the location and number of dischargers required for dispatch. Traditionally the minimum complement is based upon engine charging; i.e., only those dischargers required to quietly discharge the current produced by operating the engines in clear air would be required for dispatch. The aircraft was instrumented to measure current, discharge current, ADF radio noise and field potential. The data from this instrumentation was recorded on a system which sampled data at a rate of 5 times per second. Data plots obtained during various charging conditions are presented. Author

N83-31231 Technische Univ., Hamburg (West Germany).
ELECTRIC CHARGING BY IMPACT OF HAILSTONES AND RAINDROPS
H. Trinks and J. L. terHaseborg (German Federal Armed Forces Univ.) *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 8 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Hailstones, raindrops, and particles are electrically charged with charge values of 10 to the minus 14th power to 10 to the minus 11th power As. When the particles strike the surface of aircraft or rockets, charge transfer processes occur. Expecially impacting particles with high velocity generate small clouds of dust or water vapor. This effect is accompanied by strong electric charge separation processes. An impacting hailstone with a primary charge of about Q sub o = 10 to the minus 13th power As generates a secondary electric charge transfer of up to Q=10 to the minus 11th power As. Waterdrops and ice particles were shot against target plates. By electric field measurements and shorttime shadow photographs, the impact processes were investigated experimentally. Model computations were performed. Author

N83-31232 Ohio Univ., Athens. Center for Avionics Engineering.
THE EFFECTS OF PRECIPITATION STATIC AND LIGHTNING ON THE AIRBORNE RECEPTION OF LORAN-C c32
James D. Nickum *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 10 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

The results of ground charging tests and airborne biased-discharger flight tests are presented to indicate the precipitation (p) static noise performance improvement obtained by using static-wick dischargers on an aircraft for the reception of LORAN-C. An instrumented aircraft was flown near areas of thunderstorm conditions to collect data on noise due to p-static discharging. The data indicate that significant improvement in p-static noise reduction is possible by using static-wick dischargers on the airframe to maintain adequate LORAN-C signal-to-noise in p-static discharging conditions. Author

N83-31233* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DIGITAL SYSTEM UPSET: THE EFFECTS OF SIMULATED LIGHTNING-INDUCED TRANSIENTS ON A GENERAL PURPOSE MICROPROCESSOR **c60**
Celeste Belcastro *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 12 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00 CSCL 09B

Flight-critical computer-based control systems designed for advanced aircraft must exhibit ultrareliable performance in lightning-charged environments. Digital system upset can occur as a result of lightning-induced electrical transients, and a methodology was developed to test specific digital systems for upset susceptibility. Initial upset data indicates that there are several distinct upset modes and that the occurrence of upset is related to the relative synchronization of the transient input with the processing state of the digital system. A large upset test data base will aid in the formulation and verification of analytical upset reliability modeling techniques which are being developed. Author

N83-31234 British Aerospace Public Ltd. Co., Lancashire (England).
LIGHTNING PROTECTION DESIGN AND LIGHTNING THREAT FLIGHT CLEARANCE OF A FLY-BY-WIRE FLIGHT CONTROL SYSTEM FOR AN UNSTABLE AIRCRAFT **c08**
P. A. Doggett and I. P. MacDiarmid *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 10 p ref (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

The design measures taken in the installation of a fly-by-wire system in a Jaguar aircraft relative to lightning strike protection are discussed. The whole aircraft simulated lightning strike tests carried out are briefly described, together with complementary bench tests. The experience gained is reviewed and used to provide a basis for a consistent philosophy of design and test. R.J.F.

N83-31235* Johns Hopkins Univ., Baltimore, Md. Dept. of Electrical Engineering and Computer Science.
UPSET EXPERIMENTATION IN COMPUTER-BASED SYSTEMS **c60**
Gerald M. Masson *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 9 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

General issues relative to transient disturbances in computer-based systems are discussed. It is noted that computer system operation can be adversely affected by physical disturbances emanating from a wide variety of sources. These disturbances, often transient in nature, are manifested in computer systems as upsets. An upset of a computer system is defined as a performance deviation that is based on a-priori operation knowledge of the computer system's task. The results of a computer system upset can be as obvious as a complete system crash or as intermittent computational errors. Hence, there exists a need to access computer system susceptability/resilience relative to transient disturbances with systematic experimentation. Several fault injection experiments are discussed. R.J.F.

N83-31236* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CONDITIONS CONDUCIVE TO LIGHTNING STRIKING AN AIRCRAFT IN A THUNDERSTORM **c03**
Vladislav Mazur (Oklahoma Univ.), Bruce D. Fisher, and John C. Gerlach *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 7 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

The UHF band radar at NASA/Wallops Island Research Facility was used for guiding the NASA F106 research aircraft through the upper regions of storms with lightning activity in them so that the aircraft would be struck by lightning. The radar was used also as a tool to study nature and the characteristics of direct lightning strikes on the aircraft, and to determine the environmental conditions favorable to such strikes. The analysis of lightning echoes at the moments of the strikes strongly indicates that the aircraft itself triggers the lightning, rather than intercepting a naturally produced flash. Correlations between the probability of a direct strike during a storm penetration and the intensity of rain and turbulence, temperature, and lightning flash rate in the storms penetrated were investigated. R.J.F.

N83-31237 Manchester Univ. (England). Inst. of Science and Technology.
LIGHTNING INITIATION IN THUNDERCLOUDS
J. Latham *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 4 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Experiments were carried out to determine the electric field, E sub c, required to obtain corona from both ice particles and colliding drop-pairs. In the former case it was found that corona currents of about 0.1 micro A and above could be obtained from ice particles a few millimeters in length for E sub c approximately 400,000 V M(-1) for values of temperature and pressure liekly to occur in the mid-regions of a thundercloud. These currents were drastically reduced if temperature was below -18 C, owing to the reduction in surface conductivity suffered by the ice sample. In the second set of experiments a pair of water drops, of radii R=2.7mm and r=0.65mm, collided with a relative velocity of 5.8m s(-1). Values of E sub c ranged from approximately 500,000 V m(-1) for head-on collisions to approximately 250,000 V m(-1) for glancing collisions which produced, momentarily, long liquid filaments. R.J.F.

N83-31238 Technische Univ., Dresden (West Germany).
THE ORIGIN OF THUNDERSTORM ELECTRICITY
Anton Puehringer *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 9 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

The generation of electricity by electromagnetic induction (e.m.i.) is considered as a basis for a thunderstorm theory. All presuppositions for the application of the e.m.i. to a cloud are present, because there exists electrical conductors in form of water droplets which are moved by winds in the magnetic field of the earth. The new theory, giving the possibility of involving new parameters, the wind and the geomagnetic field, in the research programs, is substantiated in many points by observations. R.J.F.

N83-31239 Technische Univ., Hamburg (West Germany).
AEROSPACE VEHICLES CHARGING BY THRUSTER PLUMES **c18**
H. Trinke *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 6 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Aerospace and spacecraft charging, a cause of a number of operational problems, is discussed. Some satellites are equipped with numerous small thruster engines to stabilize and to correct their position. Particularly thruster plumes produced by small bipropellant engines consist of electrically charged clouds of droplets, moisture and ions. A Io N engine in connection with the GALILEO spacecraft configuration was installed in a large high vacuum measuring plant equipped with electric field measurement devices suitable for the investigation of plume charging effects. A stream of charged particles leaving the thruster and interacting with spacecraft surfaces were observed. The results are discussed. R.J.F.

N83-31240 SRI International Corp., Menlo Park, Calif.
ALLOCATION OF PROTECTION **c03**
E. F. Vance, J. E. Nanevicz, W. Graf, and J. M. Hamm *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 5 p (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

A procedure for determining how much protection is needed between the external lightning environment and the circuits inside equipment is developed on the basis of nested shields or electromagnetic barriers. Part of this protection is usually placed at the system level (at the aircraft skin or at a facility shield) and part may be placed at the equipment level. Four distinct allocations of protection are defined and their implications on electromagnetic compatibility and protection against lightning and other external sources are discussed. In two of these, all of the protection is allocated to one level and none is allocated to the other. When all protection is allocated to the system level, all internal cabling and equipment is protected, and no configuration control or lightning requirement on equipment is needed inside the system-level barrier to maintain the protection. When all protection is allocated to the equipment or box level, however, unprotected cabling and other system structure may remain outside the protected space (i.e., outside the boxes). R.J.F.

N83-31241 Douglas Aircraft Co., Inc., Long Beach, Calif.
THE LIGHTNING SPARK BARRIER **c33**
M. P. Amason and M. C. Hofmeister *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 3 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

Lightning protection of modern aerospace vehicles through the prevention of sparking in critical fuel vapor areas is discussed. In the past, it was particularly difficult to keep mechanical fasteners from sparking during a lightning event. Attempts to seal off the fasteners from the critical fuel vapor area by manual application of sealant material were ineffective due to gaps and voids produced by the application process. A technique was developed to control the application of dielectric sealant material to isolate the mechanical fastner sparking from the critical fuel vapor area. The technique consists of a specially designed dielectric cap that fits over the fastener, providing uniform and controlled application of dielectric filler material. An adequate thickness of filler material provides a barrier that prevents the sparks from entering the critical fuel vapor area. The lightning spark barrier is applicable to a wide variety of installations, including those with composite materials. R.J.F.

N83-31242 Boeing Vertol Co., Philadelphia, Pa.
PROTECTING THE WORLD'S LARGEST COMMERCIAL HELICOPTER FROM ATMOSPHERIC HAZARDS **c03**
Gerald A. Heiderscheidt *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 17 p refs (For primary document see N83-31163 19-47)
Copyright. Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

An in-depth look at the lightning protection features of the world's largest commercial helicopter, the Boeing 234, is given. This aircraft regularly carries 44 passengers over 580 nautical miles across water, in IFR and VFR flight conditions, at altitudes consistently placing it in foul weather conditions. The aircraft is examined from the viewpoint of systems and system protection, composite external fuel pods, composite crew nose section, radome protection and, where appropriate, specific subsystem protection. Inservice lightning strike experience is presented as well as future plans for the aircraft. R.J.F.

N83-31243 Deutscher Wetterdienst, Offenbach am Main (West Germany).
REPORTS FROM THE GERMAN METEOROLOGICAL SERVICE. NO. 161: INTERCOMPARISON OF INSTRUMENTS MEASURING OZONE NEAR THE GROUND AT THE HOHENPEISSENBERG OBSERVATORY, GERMANY 1 OCTOBER 1978-30 APRIL 1979
Walter Attmannspacher and Reinhold Hartmannsgruber 1982 16 p refs Sponsored by WMO and International Ozone Commission
(ISBN-3-88148-201-6; ISSN-0072-4130) Copyright. Avail: Issuing Activity

Three wet chemical sensors, one dry chemical (ethylene chemiluminescent) sensor and one optical sensor for the continuous measurement of ozone near the ground were tested. After maintenance instrument accuracy was checked between 0 nbar and 200 nbar ozone partial pressure. All instruments show errors < 2%, the accuracy of the ozone generator. The response time to reach 90% of the final value varies between 5 and 270 sec. The broadest and narrowest frequency distributions of the hourly mean values are shown by a wet chemical, and by the optical sensor respectively. No instrument shows interference by SO2, against which the chemical sensors were protected by filters. Interference by water vapor and by NO2 is observed in several sensors. Author (ESA)

N83-31244# Danish Meteorological Inst., Copenhagen.
WIND VECTOR AND EXTREME WIND STATISTICS IN GREENLAND
Klaus Hedegaard 1982 106 p refs
(Rept-1; ISBN-87-7478-198-7) Avail: NTIS HC A06/MF A01

Data on the wind vector are analyzed from 21 Greenlandic synoptical stations from the period 1962-1976. The probability distribution of the wind vector varies greatly among the stations and in nearly all cases exhibits a rather strong local dependence. It was analyzed which directions contributed the greater part of the total kinetic energy. This analysis shows great variability among the stations. In Umanak 95% of the kinetic energy stems from one direction, while at Kap Tobin only 53% can be ascribed to one direction. The extreme wind speeds for the stations were determined. They exhibit great variations. For the 50-year wind speed the variation is from 57 m/s in Angmagssalik to only 22 m/s in Sondre Stromfjord. Author

N83-31245# Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
WATER VAPOR CHARACTERISTICS OVER NOTHEAST BRAZIL DURING TWO CONTRASTING YEARS
Brahamanda Vadlamudi Rao and Valdo daSilva Marques May 1983 19 p refs Submitted for publication
(INPE-2739-PRE/318) Avail: NTIS HC A02/MF A01

Water vapor characteristics of Northeast Brazil for two contrasting years are discussed. Precipitation efficiences were very low in the dry year 1976 compared to their values in the heavy rainfall year 1974. This is due to low precipitation in 1976, showing the inefficiency of precipitation producing mechanism. Calculation of water vapor flux during the two contrasting years showed the importance of the south Atlantic Ocean in providing water vapor for NE Brazil. The change of water vapor flux direction at the northern most points suggests the role of the intertropical convergence zone (ITCZ) in the interannual variation of the climate over NE Brazil. Author

N83-31246*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THUNDERSTORM OBSERVATIONS FROM SPACE SHUTTLE
B. Vonnegut (State Univ. of New York, Albany), O. H. Vaughan, Jr., and M. Brook (Mexico Inst. of Mining and Technology, Socorro) Jun. 1983 30 p refs
(NASA-TM-82530; NAS 1.15:82530) Avail: NTIS HC A03/MF A01 CSCL 04B

Results of the Nighttime/Daytime Optical Survey of Lightning (NOSL) experiments done on the STS-2 and STS-4 flights are covered. During these two flights of the Space Shuttle Columbia, the astronaut teams of J. Engle and R. Truly, and K. Mattingly II and H. Hartsfield took motion pictures of thunderstorms with a 16 mm cine camera. Film taken during daylight showed interesting thunderstorm cloud formations, where individual frames taken tens of seconds apart, when viewed as stereo pairs, provided information

on the three-dimensional structure of the cloud systems. Film taken at night showed clouds illuminated by lightning with discharges that propagated horizontally at speeds of up to 10 to the 5th m/sec and extended for distances on the order of 60 km or more. Author

N83-31247# Naval Postgraduate School, Monterey, Calif. Dept. of Meteorology.
ESTIMATION AND MAPPING OF CLOUDS AND RAINFALL AREAS WITH AN INTERACTIVE COMPUTER M.S. Thesis
Cynthia Ann Nelson Dec. 1982 137 p refs
(AD-A126845) Avail: NTIS HC A07/MF A01 CSCL 09/2

An automated cloud analysis program was developed and established on the SPADS (Satellite Data Processing and Display System) computer system at the Naval Environmental Prediction Research Facility (NEPRF). The program evaluates GOES (Geostationary Operational Environmental Satellite) visual and infrared satellite imagery simultaneously. The analysis method produces information on cloud types, cloud amount, precipitation intensity, and cloud top height and temperature through use of threshold tests of radiance, texture, and temperature. A review of current work on the evaluation of satellite information by computer and by manual analysis is included. A maritime region 460 X 460 nautical miles in size was selected for test analysis. The satellite imagery was manually evaluated and compared to the computer generated output. Reasonably good patterns of cloud types, precipitation and cloud amount were produced by the computer, although further testing and verification is needed. GRA

N83-31248# Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
THE FREQUENCY OF OCCURRENCE OF AIR MASSES OVER TWELVE EUROPEAN CITIES Final Report
Marvin D. Kays, John T. Allen, and Louis D. Duncan Jan. 1983 48 p refs
(DA Proj. 1L1-62111-AH-71)
(AD-A126835; ERADCOM/ASL-TR-0123) Avail: NTIS HC A03/MF A01 CSCL 04/2

Six different air masses that occur over twelve European cities are defined and discussed. The frequency of occurrence of the individual air masses over these cities over a period of several years was determined. The observations taken were reduced to monthly percentages. Continental polar and maritime polar were by far the most predominant air masses during the period of time studied. Continental polar was observed most frequently at seven of the cities and maritime polar most often at the other five cities, totaling 38 percent and 34 percent, respectively. The other four air masses combined only totaled 28 percent on an overall basis. The inland cities experience more continental polar air while the western cities nearer the sea coasts are dominated more by maritime polar air masses. Research related to maritime and continental aerosols and the influence of meteorological parameters upon aerosol particulates is described. Author (GRA)

N83-31249# Brookhaven National Lab., Upton, N. Y. Atmospheric Sciences Div.
DATA REPORT FOR THE 1977 LAND-AIR-SEA INTERACTION EXPERIMENTS
S. SethuRaman and C. Henderson Aug. 1982 166 p refs
(Contract DE-AC02-76CH-00016)
(DE83-012451; BNL-51632) Avail: NTIS HC A08/MF A01

An air sea interaction experiment was conducted about 5 km off the south shore of Long Island, New York from May to October 1977. Instrumentation at the buoy measured mean meteorological variables, turbulence, wind profile, sea surface temperature and buoy action. The data were telemetered continuously to the Shore Station at Tiana where they were recorded in magnetic tapes for later processing. Turbulence data were also obtained at a 24 m tower at the beach and the information recorded simultaneously with the buoy observations. Statistical parameters are presented in this report. DOE

N83-31250# California Univ., Livermore. Lawrence Livermore Lab.
SPATIALLY AVERAGING CROSS-WIND SENSORS AND NUMERICAL-MODEL RESULTS FOR NOCTURNAL DRAINAGE WINDS IN COMPLEX TERRAIN
W. M. Porch and R. Lange Nov. 1982 4 p refs Presented at the 6th Am. Meteorol. Soc. Symp. on Turbulence And Diffusion, Boston, 22 Mar. 1983
(Contract W-7405-eng-48)
(DE82-021220; UCRL-87797; CONF-830307-2) Avail: NTIS HC A02/MF A01

Drainange wind effects on tracer transport and diffusion in complex terrain, as part of the Atmospheric Studies in Complex Terrain (ASCOT) project were studied tracer measurements, conventional tower and remote sensing meteorological measurements, and numerical wind field transort and diffusion models were combined. One part of the meteorological measurement support used eight optical cross path wind sensors across the principle air drainage valleys. These sensors had varying optical path lengths within the drainage optical wind sensor and conventional tower mounted cup vane anemomter data into a numerical plume transport and diffusion model for complex terrain provides useful results. The most important of these results is an independent measure of wind data on a spatial scale compatible with necessarily large grid scales in numerical wind field models with topography. Terrian associated exposure problems for tower anemometers in complex terrain are asessed. The optical cross wind data are used to compare necessary averaging times, and spatial distribution of point sensors and provide verification data to improve the logistics of instrument placement in combination with numerical models. DOE

N83-31251# National Bureau of Standards, Washington, D.C. Center for Building Technology.
TORNADO DAMAGE RISK ASSESSMENT
T. A. Reinhold and B. Ellingwood Sep. 1982 61 p refs
(Contract DE-AC02-76CH-00016)
(DE83-006941; NUREG/CR-2944; BNL-NUREG-51586) Avail: NTIS HC A04/MF A01

Several proposed models were evaluated for predicting tornado wind speed probabilities in nuclear plant sites as part of a program to develop statistical data on tornadoes needed for probability based load combination analysis. A unified model was developed which synthesized the desired aspects of tornado occurrence and damage potential. The sensitivity of wind speed probability estimates to various tornado modeling assumptions are examined, and the probability distributions of tornado wind speed that are needed for load combination studies are presented. DOE

N83-31252# Oregon State Univ., Corvallis. Dept. of Atmospheric Sciences.
REMOTE SENSING FOR WIND POWER POTENTIAL. A PROSPECTOR'S HANDBOOK
J. E. Wade, P. A. Maule, G. Bodvarsson, C. L. Rosenfeld, S. G. Woolley, and M. R. McClenahan Aug. 1982 321 p refs
(Contract DE-AT06-76ET-20316)
(DE83-007037; DOE/ET-20316/81-1; PNL-3938) Avail: NTIS HC A14/MF A01

Three case studies that employ remote sensing prospecting techniques are described. Based on remotely sensed evidence, the wind power potential in three geographically and climatically diverse areas of the United States is estimated, and the estimates are compared to actual wind data in those regions. In addition, the cost of each survey is discussed. The results indicate that remote sensing for wind power potential is a quick, cost effective, and fairly reliable method for screening large areas for wind power potential. DOE

N83-31253# Freese-Notis Weather, Inc., Des Moines, Iowa.
LEARNING TO FORECAST WIND AT REMOTE SITES FOR WIND-ENERGY APPLICATIONS Final Report
C. Notis, D. W. Trettel, J. T. Aquino, T. R. Piazza, L. E. Taylor, D. C. Trask, H. L. Wegley, and A. H. Miller Jan. 1983 239 p refs

Prepared in cooperation with Murray and Trettel, Inc. and PNL
(Contract DE-AC06-76RL-01830)
(DE83-008756; PNL-4318) Avail: NTIS HC A11/MF A01

Observed wind patterns are correlated with synoptic or mesoscale weather systems. Six sites selected for analysis include Montauk Point, New York; Boone, North Carolina; Ludington, Michigan; Clayton, New Mexico; Amarillo, Texas; and San Gorgonio Pass, California. Objectives of the analysis are: to identify synoptic and/or mesoscale weather patterns that are associated with recognizable wind events at the sites; to define a set of criteria that uniquely describes such weather patterns; to estimate the reliability (accuracy) of forecasting rules derived from the association of weather patterns and site winds; and to attempt to separate any mesoscale effects of local topography from the synoptic-scale effects. One-to-one mapping of wind regimes onto synoptic types was not found. It was concluded that four factors should be examined when stratifying wind regimes: synoptic situation, descriptive climatology, pressure gradient vector, and winds aloft. The wind forecasting approach developed was intended for forecasting hourly average winds out to the 24 hour or possibly 36 hour time horizon. DOE

N83-31254# Redmann (Gunther H.) and Associates, Littlerock, Calif.
WINDFIELD AND TRAJECTORY MODELS FOR TORNADO-PROPELLED OBJECTS Final Report
G. H. Redmann, J. R. Radbill, J. E. Marte, P. Dergarabedian, and F. E. Fendell Mar. 1983 360 p refs Sponsored by EPRI
(EPRI Proj. 308)
(DE83-901859; EPRI-NP-2898) Avail: NTIS HC A16/MF A01

The aerodynamic coefficients for the postulated missiles were obtained from full scale wind tunnel tests on a 12 inch pipe and car and from drop tests. Rocket sled tests were run whereby the 12 inch pipe and car were injected into a worst case tornado windfield in order to verify the trajectory model. To simplify and facilitate the use of the trajectory model for design applications without having to run the computer program, this report gives the trajectory data for NRC postulated missiles in tables based on given variables of initial conditions of injection and tornado windfield. Complete descriptions of the tornado windfield and trajectory models are presented. The trajectory model computer program is also included for those desiring to perform trajectory or sensitivity analyses beyond those included in the report or for those wishing to examine other missiles and use other variables. DOE

N83-31255# Royal Netherlands Meteorological Inst., De Bilt.
PRECIPITATION IN THE NETHERLANDS Annual Report, 1981
1982 127 p In ENGLISH and DUTCH
(KNMI-117-82) Avail: NTIS HC A07/MF A01; Royal Netherlands Meteorological Inst., De Bilt DFL 15

Precipitation data from Dutch weather stations for 1981 are presented. Annual, monthly, 10-day, and daily totals are given. Author (ESA)

N83-31256# Institut Royal Meteorologique de Belgique, Brussels.
[ACTIVITIES IN METEOROLOGY] Annual Report, 1982 [L'INSTITUT ROYAL METEOROLOGIQUE DE BELGIQUE]
1982 140 p refs In FRENCH
Avail: NTIS HC A07/MF A01

Research in bioclimatology, hydrology, aeronomy, aerology, applied meteorology, geophysics, and atmospheric pollution and diffusion is summarized. Topics include telemetry, atmospheric radioactivity, atmospheric circulation, radiometry, synoptic meteorology, mesometeorology, terrestrial magnetism and telluric currents, seismology, and cosmic radiation. Author (ESA)

N83-31257# Colorado Dept. of Natural Resources, Denver. Weather Modification Program.
SNOWPACK AUGMENTATION RESEARCH NEEDS: A HISTORY OF WEATHER MODIFICATION IN COLORADO Final Report, May 1979 - Jun. 1982
Barbara C. Welles 1 Jun. 1982 88 p refs
(Contract DI-9-07-85-V0027)
(PB83-165373) Avail: NTIS HC A05/MF A01 CSCL 04B

The main focus of weather modification activity in the state of Colorado is the augmentation of winter snowpack. Needed research projects of particular importance to the state are identified, a history of Colorado weather modification legislation and projects conducted after 1972 are described. GRA

N83-31258# South Dakota School of Mines and Technology, Rapid City.
RESEARCH ON EVOLVING DESIGN AND EVALUATION OF THE HIPLEX (HIGH PLAINS COOPERATIVE PROGRAM) PROGRAM Final Technical Rept, Dec. 1977 - Nov. 1982
P. L. Smith, P. W. Mielke, Jr. (Colorado State Univ., Fort Collins), K. J. Berry (Colorado State Univ., Fort Collins), A. A. Doneaud, R. D. Farley, J. H. Hirsch, F. J. Kopp, J. R. Miller, Jr., H. D. Orville, and D. L. Priegnitz Nov. 1982 135 p refs
(Contract DI-8-07-83-V0009)
(PB83-169060) Avail: NTIS HC A07/MF A01 CSCL 04B

This report summarizes five years of research related to the design, conduct, and evaluation of the U.S. Bureau of Reclamation's HIPLEX program. Most of this research concerned the HIPLEX-1 experiment that inolved randomized seeding of small Montana cumulus congestus clouds with dry ice. The report discusses the design, conduct, and response variables of HIPLEX-1 and presents a statistical evaluation of the experiment. Author (GRA)

N83-31259# National Academy of Sciences - National Research Council, Washington, D. C. Geophysics Study Committee.
CLIMATE IN EARTH HISTORY Final Report
Wolfgang H. Berger and John C. Crowell Dec. 1982 212 p refs Presented at the Am. Geophy. Union, Toronto, May, 1980 Sponsored in part by NSF and NOAA
(Contract DE-FG02-80ER-10757)
(NASA-CR-172826; NAS 1.26:172826; PB83-169193; QC844.C574; ISBN-0-309-03329-2) Avail: NTIS HC A10/MF A01 CSCL 04B

Complex atmosphere-ocean-land interactions govern the climate system and its variations. During the course of Earth history, nature has performed a large number of experiments involving climatic change; the geologic record contains much information regarding these experiments. This information should result in an increased understanding of the climate system, including climatic stability and factors that perturb climate. In addition, the paleoclimatic record has been demonstrated to be useful in interpreting the origin of important resources-petroleum, natural gas, coal, phosphate deposits, and many others. Author (GRA)

N83-31260# National Oceanic and Atmospheric Administration, Madison, Wis. Development Lab.
METHOD FOR IMPROVING THE ESTIMATION OF CONDITIONAL INSTABILITY FROM SATELLITE RETRIEVALS
W. E. Togstad, J. M. Lewis, and H. M. Woolf Nov. 1982 38 p refs
(PB83-169938; NOAA-TR-NESS-93; NOAA-83022204) Avail: NTIS HC A03/MF A1 CSCL 04B

A method is presented for improving the estimation of conditional instability from satellite retrievals in preconvective environments. A set of radiances simulated for the VAS-D instrument from a data base comprised of 139 tornado proximity and precedent soundings was studied. Basically, a guess moisture profile is modeled in two layers characteristic of pre-storm conditions. In addition, a stability index (termed the Parcel Energy or PE index) is introduced which optimizes satellite retrieval information for assessing conditional instability. GRA

N83-31261# National Oceanic and Atmospheric Administration, Boulder, Colo.
OPTIMIZATION FOR THE ALGORITHMS OF AN OPERATIONAL LASER WEATHER IDENTIFIER
D. C. Brinning, G. R. Ochs, R. S. Lawrence, and Ting-i Wang Oct. 1982 30 p refs
(PB83-169979; NOAA-TM-ERL-WPL-107; NOAA-83022302) Avail:

NTIS HC A03/MF A01 CSCL 04B

A prototype Laser Weather Identifier (LWI) including the vertical velocity measurement was built. The instrument was collecting data since March 1981 for various types of precipitation. The data analysis was discussed and recommendations given for the algorithms of an operational LWI. GRA

N83-31262# National Oceanic and Atmospheric Administration, Miami, Fla. Research Facilities Center.

SENSITIVITY OF VARIABLES COMPUTED FROM RFC (RESEARCH FACILITIES CENTER) WP3D FLIGHT DATA TO FLUCTUATIONS IN THE RAW DATA INPUTS

Francis J. Merceret Dec. 1982 49 p refs

(PB83-169987; NOAA-TM-ErL-RFC-8; NOAA-83022304) Avail: NTIS HC A04/MF A01 CSCL 04B

This paper presents an investigation of the sensitivity of the meteorological data obtained by Research Facilities Center (RFC) to variations in each of the raw data inputs. Each NOAA/RFC WP3D weather reconnaissance aircraft directly measures 16 raw quantities with its main meteorological data system. From these, 29 functions (including intermediate values) are computed yielding the standard meteorological and navigational quantities used for research. The results presented here may be used to estimate the effect of noise or errors in the input signals on the resulting outputs. Author (GRA)

N83-31263# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.

TRIPLE-BEAM ANTENNA FOR WIND-PROFILING RADAR

K. B. Earnshaw, D. C. Hogg, and R. G. Strauch Dec. 1982 28 p refs

(PB83-171074; NOAA-TM-ERL-WPL-108; NOAA-83022303) Avail: NTIS HC A03/MF A01 CSCL 04B

An offset paraboloid with prime focus feeds that produce three fixed beams, one directed in the zenith, and two 15 degrees off zenith is discussed. The antenna is used for profiling of winds in the troposphere at UHF (915 MHz). A unique method involving tilting the reflector produces the desired beam directions, and the displacement of the feeds is only 1/square root of 2 of the conventional displacement. Measurement of the phase and amplitude of the aperture fields on a 17-GHz model show good agreement with ray tracing computation. For the beam offset from boresite in the plane of symmetry, astigmatism is the first aberration observed, whereas coma is significant for a beam offset in the asymmetrical plane. Far field patterns obtained from measurements using far field scanner are compared with computation. GRA

N83-31264# National Oceanographic Data Center, Washington, D. C.

MARINERS WEATHER LOG, VOLUME 27, NUMBER 1

1983 65 p

(PB83-175919; NOAA-83030904) Avail: NTIS HC A04/MF A01 CSCL 04B

Contents: Articles; Hints to the observer; Marine observations program; Tips to the radio officer; Marine weather review.

Author (GRA)

N83-31265# Colorado State Univ., Fort Collins. Dept. of Civil Enginering.

GRAVITY SPREADING AND DISPERSION OF DENSE GAS CLOUDS RELEASED SUDDENLY INTO A TURBULENT BOUNDARY LAYER Topical Report, Jun. 1980 - Jul. 1981

Robert N. Meroney and Achim Lohmeyer (Karlsruhe Univ., West Germany) Aug. 1982 241 p ref Sponsored by Gas Research Inst.

(PB83-188631; CER82-83RNM-AL-7; GRI-82-0025) Avail: NTIS HC A11/MF A01 CSCL 04B

Wind tunnel concentration data obtained from modeling tests of the dispersion of three different source volumes released in five wind field conditions. Multiple replication of each experiment provided statistics of cloud behavior. Results were compared against numerical box and depth averaged models to specify entrainment constants and evaluate behavior. Extrapolation of the results to sudden spills of quantities of Propane suggest that current Gaussian-plume predictions using the CHRIS approach are incorrect. GRA

N83-31266# National Weather Service, Garden City, N.Y.

DECODERS FOR FRH, FTJ AND FD PRODUCTS

Cynthia M. Scott Feb. 1983 32 p

(PB83-176057; NOAA-NWS-ERCP-8; NOAA-83030802) Avail: NTIS HC A03/MF A01 CSCL 04B

Numerical output from the LFM and trajectory models is available in AFOS in the FRH, FTJ and various FD products. This information has many potential uses in local meteorological applications programs. The three basic subroutines in this package extract any desired value from these products. Additional subroutines are available to minimize database access when data for many stations are extracted from the bulletin format products (FRH and FTJ). A useful program for working with data bases products that were unpacked into arrays is described. GRA

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N83-31267# Institute of Oceanographic Sciences, Birkenhead (England). Bidston Obs.

THE TIDAL DYNAMICS OF THE WESTERN NORTH SEA

Jacques Sauvel (Service Hydrographique et Oceanographique de la Marine, Paris) 1982 97 p refs

(IOS-138) Avail: NTIS HC A05/MF A01

The currents and elevations of a coastal strip 200 x 30 miles on the East Coast of England were studied. Results show significant differences between a model of single Kelvin wave propagation and the real tidal dynamics. The nonprogressive part of the tidal waves have a prevailing direction between 53 and 67 deg north of east. Simple theory can explain the observed vertical structure of tidal currents in this region. The nontidal residuals for the currents are dominated by inertial currents. Currents and elevations agree with values computed using an established numerical model. Study of the energy budget shows good agreement between the values of the energy fluxes at the boundaries, and the bottom friction dissipation, from the experiments and from the model. The energy flux balance is sensititive to small changes in the boundary interpolation schemes.

Author (ESA)

N83-31268# Institute of Oceanographic Sciences, Wormley (England). Natural Environment Research Council.

DESIGN AND MODEL TESTING FOR AN AUTONOMOUS DEEP OCEAN CURRENT SENSING DEVICE

A. R. Packwood 1982 37 p refs

(IOS-141) Avail: NTIS HC A03/MF A01

A freefall self recording current and temperature sensing device was designed to study the benthic boundary layer. The device underwent freefall, overturn and buoyancy lift and drag tests. A small aluminum frame is suggested to protect the sensors. The logging/battery tubes are mounted horizontally above the frame to reduce lateral drag which is a severe constraint if the device is to withstand currents of 80 cm/sec. The instruments record at a height of 50 cm off the sea bed, with an unobstructed azimuth window of 134 deg. Recommended additional ballast weight is 88 kg in water to prevent the instrument overturning in a 80 cm/sec current. Buoyancy selected is 6 x 17 in. Benthos glass spheres stacked 3 on 3, separated from the sea bed unit by a 10 m wire strop. Terminal velocity is between 84 and 106 cm/sec on descent and 54 and 66 cm/sec on ascent.

Author (ESA)

N83-31269# RF Reedereigmeinschaft Forschungsschiffart G.m. b.H., Bremen (West Germany).

GEOSCIENTIFIC AND INDUSTRIAL EVALUATION OF THE MULTIECHO SOUNDING SYSTEM SEA BEAM WITH R/V SONNE

(CRUISE SO-21) IN THE CENTRAL PACIFIC Final Report, Jul. 1982
Gerald Abich, Rainer Fellerer (Preussag AG Erdoel und Erdgas), Helmut Richter (Preussag AG Erdoel und Erdgas), Jens Monenschein (Preussag AG Erdoel und Erdgas), Friedrich-Carl Koegler (Kiel Univ.), Harald Puchelt (Karlsruhe Univ., West Germany), Johannes Ulrich (Kiel Univ.), and Juergen Fritsch (Bundesanstalt fuer Geowissenschaften und Rohstoffe) Bonn Bundesministerium fuer Forschung und Technologie Mar. 1983 117 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-M-83-001; ISSN-0340-8868) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 24,50

A multiecho sounding system was tested in the Pacific. The system measures water depths beneath the ship and presents the data in the form of a contour map of the sea floor. The system fully meets expectations for a more rapid and more accurate mapping of the sea floor. Applications include geological sampling, use of towed systems, and the mining of manganese nodules.
Author (ESA)

N83-31270# Geological Survey, Woods Hole, Mass.
GEORGES BANK MONITORING PROGRAM: ANALYSIS OF TRACE METALS IN BOTTOM SEDIMENTS Final Report
M. H. Bothner, R. R. Rendigs, Esma Campbell, M. W. Doughten, P. J. Aruscavage, A. F. Dorrzapf, Jr., R. G. Johnson, C. M. Parmenter, M. J. Pickering, D. C. Brewster et al 28 Dec. 1982 67 p refs
(Contract DI-AA851-IA2-18)
(PB83-174888; BLM/YL-ES-82-10) Avail: NTIS HC A04/MF A01 CSCL 08J

From July 1981, when drilling began on Georges Bank, to May 1982, the concentration of barium has increased by a factor of 3.5 in bulk sediments 200m from the drill site in block 410 and by a factor of 2.3 at the drill site in block 312. The post-drilling Ba concentrations are within the range of pre-drilling concentrations measured at other locations on Georges Bank. The concentrations of Al, Ba, Cd, Cr, Cu, Fe, Hq, Mn, Ni, Pb, V, and Zn in surface sediments of Georges Bank both before and after drilling are low compared to average crustal abundances and are characteristic of unpolluted coarse-grained sediments as found in other Continental Shelf areas. Author (GRA)

N83-31271# National Oceanic and Atmospheric Administration, Miami, Fla. Atlantic Oceanographic and Meteorological Labs.
CTD/02 DATA COLLECTED IN NOVEMBER 1981 AND MARCH 1982 FOR EPOCS (EQUATORIAL PACIFIC OCEAN CLIMATE STUDIES)
Carol Roffer and Ants Leetma Dec. 1982 128 p
(PB83-170001; NOAA-TM-ERL-AOML-52; NOAA-83022305) Avail: NTIS HC A07/MF A01 CSCL 08J

Hydrographic data collected on two cruises during the Equatorial Pacific Ocean Climate Studies (EPOCS) in 1981 and 1982 are reported. The data were recorded with a Neil Brown Instrument Systems CTD/02. Descriptions of the CTD/02 instrument, and data acquisition, processing and calibration techniques are given. Profiles of temperature, salinity, sigma-T and oxygen are plotted for each cast. The cruise track for both cruises is shown.
Author (GRA)

N83-31272# Lamont-Doherty Geological Observatory, Palisades, N. Y.
OCEANOGRAPHIC DATA IN THE ROSS SEA AND ALONG GEORGE V COAST 1976-1979
Stanley S. Jacobs and William E. Haines Oct. 1982 510 p refs (Grant NSF DPP-76-11872)
(PB83-166413; LDGO-82-1) Avail: NTIS HC A22/MF A01 CSCL 08J

Reported here are physical oceanographic measurements made during austral summers to evaluate interactions between sea water and the Antarctic ice shelves and to better understand the large scale Ross Sea circulation. The several programs included: observations beneath Ross Sea at the J-9 site, and completion of and reoccupation of a detailed grid of oceanographic stations throughout the Ross Sea. Ocean currents were measured at J-9 for up to 48 hours and near the ice shelf for seven months. GRA

N83-31273# Norwegian Hydrodynamic Labs., Trondheim.
DIRECTIONAL WAVE SPECTRA FROM THE FRIGG FIELD IN THE NORTH SEA
Martin Mathiesen and Turid Faanes 22 Oct. 1982 84 p refs
(PB83-17058; NHL-2-82092; ISBN-82-595-2969-6; STF60-A82092)
Avail: NTIS HC A05/MF A01 CSCL 08C

At the Frigg Field Quarters platform an instrument system capable of providing directional wave information has been operational since June 1980. This report is mainly concerned with the task of establishing the capabilities and limitations of this instrument system. The instrument system also has clear limitations as no meaningful directional information is obtained for wave frequencies higher than 0.20 Hz. Author (GRA)

N83-31274# Puerto Rico Univ., Mayaguez. Dept. of Marine Sciences.
SEDIMENTARY AND PHYSICAL DYNAMIC PROCESSES OF SELECTED ESTUARIES AND RIVER INLETS OF PUERTO RICO Final Completion Report
Jack Morelock, Kurt Grove, and M. L. Hernandez 1983 72 p refs
(Contract DI-14-34-0001-1141)
(PB83-175240; W83-02179; OWRT-A-051-PR(1)) Avail: NTIS HC A04/MF A01 CSCL 08C

Sediment deposition on the Anasco-Mayaguez shelf reflects sea level rise over a subaerially developed surface interacting with carbonate reef and river sediment sources. Wave and current patterns have played a role in distribution of the sediments. Coral reefs formed on local highs and contributed skeletal components to the sediment. Deepening sea level changed the character of the terrigenous deposits and reef sediments. As sea level approached the present level, patterns of modern sediment deposition began. Author (GRA)

N83-31275# National Ocean Survey, Rockville, Md.
US COAST PILOT 2, ATLANTIC COAST: CAPE COD TO SANDY HOOK, 18TH EDITION
Jan. 1983 329 p
(PB83-175901; NOAA-83030801) Avail: NTIS HC A15/MF A01 CSCL 08C

United States Coast Pilots-The National Ocean Survey Coast Pilots are a series of nine nautical books that cover a wide variety of information important to navigators of U.S. coastal and intracoastal waters, and the waters of the Great Lakes. Pilot subjects include navigation regulations, outstanding landmarks, channel and anchorage peculiarities, dangers, weather, ice, freshets, routes, pilotage, and port facilities. Author (GRA)

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N83-31276# Junta de Energia Nuclear, Madrid (Spain). Div. de Isotopos.
EFFECT OF GAMMA RADIATION ON GROWTH, PRODUCTIVITY AND PROTEIN CONTENT OF CHLORELLA PYRENOIDOSA
C. MartinMoreno and J. FernandezGonzalez 1983 51 p refs In SPANISH; ENGLISH summary
(JEN-537; ISSN-0081-3397; ISBN-84-500-8668-X) Avail: NTIS HC A04/MF A01

The effect of five doses of gamma radiation (10, 100, 500, 1000 and 5000 Gy at a dose rate of 4.500 Gy/h) on growth, productivity and protein content of Chiorella Pyroneldosa was studied. High doses of gamma radiation were observed to inhibit cellular division of Chlorella Pyrenoldosa. Culture growth stopped 48 hours after irradiation at 5.000 Gy and 72 hours after irradiation

at 500 and 1000 Gy. The lowest dose (10 Gy) produced a little growth stimulation that was not statistically significant. Protein and amino acid content did not show any change for the gamma radiation doses studied. Author

N83-31277# Junta de Energia Nuclear, Madrid (Spain). Div. de Quimica y Medio Ambiente.

THERMO-RADIOSENSITIVITY OF THE GRANULOCYTE AND MACROPHAGE PRECURSOR CELLS OF MICE. PART 1: DEVELOPMENT OF THE IN VIVO CULTURE AND EFFECTS INDUCED BY THE HYPERTHERMIA

J. A. Bueren and M. Nieto 1983 159 p refs In SPANISH; ENGLISH summary

(JEN-526; ISSn-0081-3397; ISBN-84-500-8367-2) Avail: NTIS HC A07/MF A01

The agar diffusion chamber technique for culturing graniulocyte macrophage precursor cells obtained from mice bone marrow is described. Diffusion chambers containing the bone marrow suspension are implanted intraperitoneally into mice and constitute a compartment which avoids the migration of cells, but allows the transit of the mouse biological fluxes, necessary for the cellular proliferation. By means of this technique, the lethal effects of the hyperthermia on the precursors and their capacity to repair sublethal damage were studied. The results indicate the high thermosensitivity of the cells and also their multiplicity of targets that, in agreement with the statement of other authors, seem to be composed of proteins. Author

N83-31278# Junta de Energia Nuclear, Madrid (Spain). Div. de Isotopos.

ISOLATION OF C-14 LABELLED AMINO ACIDS BY BIOSYNTHESIS IN MAIZE PLANTS (ZEA MAIS L.)

N. Carreras and M. P. Mazon 1983 85 p refs In SPANISH; ENGLISH summary

(JEN-536; ISSN-0081-3397; ISBN-84-500-8474-1) Avail: NTIS HC A05/MF A01

A method of obtaining (14)C labelled amino acids by biosynthesis in maize plants which had assimilated (14)CO2, was assayed. The plants were labelled for 60 minutes with (14)CO2 produced from Ba(14)CO3 (specific activity of 148 KBg/micromol). An extract of the soluble compounds was obtained with 80% ethanol and the amino acids were separated from the rest of the soluble compounds by ion exchange chromatography on column of Dowex 50-X8 resin. Finally, seventeen amino acids were isolated and identified from the purified extract. The acid amino acids were separated in an anionic column (Dowex 1-X8) and the neutral and basic amino acids in catlonic columns (Dowex 50-X4). Author

N83-31279# Junta de Energia Nuclear, Madrid (Spain). Div. de Quimica y Medio Ambiente.

THERMO-RADIOSENSITIVITY OF THE GRANULOCYTE AND MACROPHAGE PRECURSOR CELLS OF MICE. PART 2: X-IRRADIATION EFFECTS AND INFLUENCE OF HYPERTHERMIA ON THE RADIOSENSITIVITY

J. A. Bueren and M. Nieto 1983 62 p refs In SPANISH; ENGLISH summary

(JEN-527; ISSN-0081-3397; ISBN-84-500-8365-6) Avail: NTIS HC A04/MF A01

The effects of the X-Irradiation on the viability of the granulocyte macrophage precursors, were determined by means of the agar diffusion chamber culture technique. The results show the high radiosensitivity of these cells, with survival parameters similar to those previously reported in the literature about different granulocyte crophage precursors. When a hyperthemic treatment is performed prior to the X-irradiation, a radiosensitization phenomenon is observed due to the sinergism existent between hyperthermia and X-rays on the lethality of the precursors. Author

N83-31280*# National Aeronautics and Space Administration, Washington, D. C.

ULTRASTRUCTURE OF THE ROOT CAP OF ARABIDOPSIS THALIANA L. HEYNH UNDER SPACEFLIGHT CONDITIONS

Apr 1983 6 p refs Transl. into ENGLISH from Dopovidi Akad. Nauk URSR, Ser. B, Geol., Khim. ta Biol. Nauky (USSR), no. 7, 1982 p 76-78 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-3541)

(NASA-TM-77258; NAS 1.15:77258) Avail: NTIS HC A02/MF A01 CSCL 06C

Peculiarities of the ultrastructural organization of Arabidopsis root cap cells grown from the stage of two cotyledonous leaves in the Svetoblok-1 apparatus aboard the Salyut 6 research orbital station and in the laboratory are assessed. It is established that under conditions of real space flight vacuolization of the root cap cells increses consoderably compared to the control variant. Changes in the topographya and ulstrastructure of amyloplasts as well as lysis of cell walls are observed in the material under study. An assumption is advanced on analogous cell responses observed at the ultrastructural level to weightlessness and clinostatic conditions. Author

N83-31281*# State Univ. of New York, Stony Brook. Dept. of Ecology and Evolution.

THE EFFECT OF FAST AND REGENERATION IN LIGHT VERSUS DARK ON REGULATION IN THE HYDRA-ALGAL SYMBIOSIS Final Report

Patricia Bossert and L. B. Slobodkin 29 Jul. 1983 14 p Sponsored by part by Mobil Oil Foundation and NSF

(Contract NAGw-144)

(NASA-CR-172916; NAS 1.26:172916; Contrib-450) Avail: NTIS HC A02/MF A01 CSCL 06C

Green hydra are able to regenerate tentacles after fast durations which cause brown, i.e., asymbiotic, hydra to fail completely, but the presence of endosymbiotic algae does not always enhance regeneration in fasted hydra. Green hydra whose nutritional state falls below some threshold, exhibit a light induced inhibition of regeneration. That is, hydra, fasted in the light, then randomly assigned to light or dark after decapitation, regenerate better in the dark. This effect of light does not appear to be present either in brown hydra or in normally green hydra from which the algae were removed. In a large strain of Chlorohydra viridissima, after fasts of intermediate duration (10 and 15 days), this light induced inhibition of regeneration is associated with an increase in the number of algae per gastric cell in regenerating hydra relative to non-regenerating controls. Author

N83-31282*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

PHYTOXICITY STUDY OF THE PRODUCTS OF WET OXIDATION OF A REPRESENTATIVE BIOMASS (LETTUCE)

B. L. Onisko and T. Wydeven Jul. 1983 26 p refs

(NASA-TM-84383; A-9390; NAS 1.15:84383) Avail: NTIS HC A03/MF A01 CSCL 06C

In an attempt to verify the results reported previously concerning the phytotoxicity of wet-oxidation (wet-ox) products, lettuce solids were suspended in water and then heated to 548 K for 3.6 ksec (1 hr) under 4.1x10 to the -7 Pa (400 psig at 294 K) oxygen pressure and 1.52x10 to the 8th (1500 psig at 548 K) total pressure. Such treatment resulted in oxidation of 80% of the initial organic carbon to carbon dioxide. Thirty-three percent of the remaining organic carbon was present in acetic acid. Organic nitrogen in the feed was decreased 90% by the wet-ox treatment. Ammonia and nitrogen gas were the main nitrogen products. Analysis of the liquid product of wet-ox indicated that most of the minerals essential for plant growth were present. However, when tested using a lettuce-root growth-rate assay, the solution was toxic. This toxicity was not due to excessive salt or ammonia or to an improper pH. Analysis of the wet-ox solution revealed the presence of silver and chromium, thus implicating reactor corrosion as the cause of the phytotoxicity. Both cation and anion exchange resins removed the silver and the toxicity of the liquid effluent, indicating silver as the toxic component. Uptake of both silver and chromium by lettuce roots correlated with diminished root growth. Toxicity of the solution from wet-ox was not observed when precautions were taken to minimize contact of the liquid in the reactor with the metal reactor components. Author

N83-31283*# National Aeronautics and Space Administration, Washington, D. C.
ULTRASTRUCTURE OF MERISTEM AND ROOT CAP OF PEA SEEDLINGS UNDER SPACEFLIGHT CONDITIONS
K. M. Sytnyk, E. L. Kordyum, N. O. Bilyavska, and V. O. Tarasenko Apr. 1983 8 p refs Transl. into ENGLISH from Dopovidi Akad. Nauk URSR, Ser. B, Geol., Khim. ta Biol. Nauky (USSR), no. 6, 1982 p 75-78 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-77259; NAS 1.15:77259) Avail: NTIS HC A02/MF A01 CSCL 06C

Data of electron microscopic analysis of meristem and root cap of pea seedlings grown aboard the Salyut-6 orbital research station in the Oazis apparatus and in the laboratory are presented. The main morphological and anatomical characteristics of the test and control plants are shown to be similar. At the same time, some differences are found in the structural and functional organization of the experimental cells as compared to the controls. They concern first of all the plastic apparatus, mitochondria and Golgi apparatus. It is assumed that cell function for certain periods of weightlessness on the whole ensures execution of the cytodifferentiation programs genetically determined on the Earth. Biochemical and physiological processes vary rather markedly due to lack of initially rigorous determination. Author

N83-31284*# National Aeronautics and Space Administration, Washington, D. C.
SOME RESULTS FROM STUDIES ON THE EFFECTS OF WEIGHTLESSNESS ON THE GROWTH OF EPIPHYTIC ORCHIDS
T. M. Cherevchenko and T. K. Mayko Jul. 1983 11 p refs Transl. into ENGLISH from Visnyk Akad. Nauk Ukr. RSR (USSR), no. 1, 1983 p 31-35 Original language document was announced as A83-34967 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-77262; NAS 1.15:77262) Avail: NTIS HC A02/MF A01 CSCL 06C

Epidendrum orchids were placed in a Malakhit-2 microgreenhouse aboard the Soyuz-36-Salyut-6 space station to test their growth under weightless conditions. Growth occurred but was less than in control plants left on Earth; cells were smaller and parenchymal development slowed in all tissues. Stems, roots, and leaves were smaller. The number of stomas on the leaves was about the same as in the controls, but, because of the smaller leaf size, there were more per unit area. A modeling experiment using a clinostat revealed a large decrease in gibberellin activity and auxin activity. It was assumed that weightlessness primarily affects gibberellin biosynthesis, inhibiting cell growth. Reestablishment of growth compound activity upon return of the plants to Earth was indicated by the fact that the orchids resumed growth thereafter. Author

N83-31285# European Space Agency, Paris (France).
SPACE BIOLOGY WITH EMPHASIS ON CELL AND DEVELOPMENTAL BIOLOGY
N. Longdon, comp. and O. Melita, comp. May 1983 137 p refs Proc. of Workshop, Cologne, 9-11 Mar. 1983; sponsored by European Low Gravity Research Association (ELGRA), ESA and DFVLR
(ESA-SP-206; ISSN-0379-6566) Avail: NTIS HC A07/MF A01

Spacelab Biorack investigations of the effects of reduced gravity were outiined. Sensitivity to gravity, cell differentiation, cell polarization, antibacterial activity, and embryogenesis were discussed. The use of clinostats, and experimental design were considered. For individual titles, see N83-31286 through N83-31309.

N83-31286*# Pennsylvania Univ., Philadelphia.
THE SIGNIFICANCE OF GRAVITY ON BIOLOGICAL SYSTEMS
Allan H. Brown *In* ESA Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 3-9 refs Sponsored by NASA Headquarters Life Science Research Program (For primary document see N83-31285 19-51)
Avail: NTIS HC A07/MF A01

Ground based and spaceborne (Biosatellite) research into the effects of hypogravity on biological systems is summarized. A concept of sensitivity to gravity is defined: sensitivity = dR/dQ x 1/standard deviation of R, where R is the measured biological response to a quantitative stimulus, Q. Detection and transformation of gravity information by the organism are discussed. The role of an uncommon gravity force environment as stimulus for physiologic adaptations, rather than stress, is introduced. Author (ESA)

N83-31287# European Space Agency, Noordwikj (Netherlands). Special Projects Div.
THE BIORACK **c14**
D. A. M. Mesland and A. F. L. Soons *In its* Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 11-15 (For primary document see N83-31285 19-51)
Avail: NTIS HC A07/MF A01

A multiuser facility for research on small biological specimens in the microgravity environment of Spacelab is presented. Incubator, cooler/freezer combined unit, glovebox and ancillary item function and performance are described. Experiments include investigations of the origin of circadian rhythms, the effect of gravity on fertilization, and the behavior of the plasma membrane-protein system under microgravity. Author (ESA)

N83-31288# Utah State Univ., Logan. Plant Science Dept. UMC 48.
GROUND-BASED STUDIES ON GRAVITROPISM AND ON MAXIMUM YIELD OF WHEAT
F. B. Salisbury *In* ESA Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 17-19 refs (For primary document see N83-31285 19-51)
Avail: NTIS HC A07/MF A01

The production of ethylene by clinostated plants due to mechanical stress, and leaf epinasty provoked by the ethylene were investigated. Plants were stressed mechanically without gravity compensation, and gravity compensation was provided with a minimum of mechanical stress. Mechanical stress does not induce epinasty. Clinostat epinasty and epinasty produced by periodically inverting plants is greatly reduced by ethylene inhibitors. It is suggested that normal stem growth occurs as pith tissues elongate against the resistance of outer layers. Author (ESA)

N83-31289# Institut fuer Allgemeine Botanik, Hamburg (West Germany).
A METHOD TO RECORD THE CIRCADIAN RHYTHM IN A UNICELLULAR GREEN ALGAE UNDER EXTRATERRESTRIAL CONDITIONS
D. Mergenhagen *In* ESA Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 21-24 refs (For primary document see N83-31285 19-51)
Avail: NTIS HC A07/MF A01

A device for the study of the circadian rhythm of photoaccumulation by chlamydomonas reinhardii on a space shuttle is described. A focussed light beam emitted by a tungsten light bulb shines through the cell suspension (in plastic cuvettes). A photocell mounted underneath the cuvette responds to variations of the light intensity caused by accumulation of cells in the illuminated area of the cuvette. Signals from the photocells are amplified and transferred to the data acquisition unit of the space transportation system. Each cuvette is illuminated once in 2hr. Tests with miniaturized cuvettes confirm the usefulness of the test set-up. Author (ESA)

N83-31290# Bonn Univ. (West Germany). Inst. of Botany.
HOW TO PROVE THE SENSITIVITY OF PLANTS TOWARDS GRAVITY
D. Volkmann and A. Sievers *In* ESA Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 25-26 refs Sponsored by Bundesministerium fuer Forschung und Technologie (For primary document see N83-31285 19-51)

Avail: NTIS HC A07/MF A01

A Spacelab experiment on the perception of gravity by plants is outlined. Response kinetics of the roots are correlated with the ultrastructural aspect of the gravity perceiving cells. Dry cress seeds are imbibed in a special culture vessel in orbit. After germination, growth kinetics are registered by photographs. Later on the roots are chemically fixed by glutaraldehyde and potassium permanganate. Vibration effects on dry seeds especially during launch, stability of chemical fixatives during the preflight phase, imbibition of seeds, handling of solutions under conditions of microgravity, and storage of fixed material during the postflight phase pose problems. Author (ESA)

N83-31291# Toulouse Univ. (France). Lab. de Biologie Medicale.

EFFECTS OF SPACE ENVIRONMENTAL FACTORS ON CELL PROLIFERATION

H. Planel, R. Tixador, G. Gasset, G. Richoilley, and J. C. Bes *In* ESA Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 29-31 refs (For primary document see N83-31285 19-51)

Avail: NTIS HC A07/MF A01

The roles of microgravity and cosmic rays on the growth rate, volume and water content of paramecia cells are examined. A set of cultures grown on Earth (control); a set cultivated in space and exposed to cosmic rays and radiation; and a set cultivated in the Biorack centrifuge and exposed to cosmic rays and 1g gravity are compared. Protein content, extracellular and intracellular electrolyte content, and ultrastructural data are acquired. Author (ESA)

N83-31292# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).

GROWTH AND DIFFERENTIATION OF BACILLUS SUBTILIS AT MICROGRAVITY

H. J. Rhaese (Frankfurt Univ.) and P. Schiller *In* ESA Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 33-36 refs (For primary document see N83-31285 19-51)

Avail: NTIS HC A07/MF A01

Two experiments suggested for determining the effect of prolonged microgravity on growth and sporulation of the prokaryote Bacillus subtilis are outlined. Short generation times (25 min) and remarkable sizes in population (1 billion individuals) permit the study of proliferation in 10 and more generations . The influence of microgravity on spore formation, especially on asymmetric septum formation, a typical differentiation associated event observed at the beginning of sporulation, can also be studied. Growth is monitored by optical density measurements, and differentiation by electron microscope examination of samples fixed with glutaraldehyde at different stages of sporulation.Author (ESA)

N83-31293# Toulouse Univ. (France). Faculte de Medecine.

STUDY OF ANTIBACTERIAL ACTIVITY OF ANTIBIOTICS IN SPACE CONDITIONS c52

R. Tixador, G. Richoilley, G. Gasset, N. Moatti, L. Lapchine, and J. Raffin (CNES, Toulouse) *In* ESA Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 37-39 refs (For primary document see N83-31285 19-51)

Avail: NTIS HC A07/MF A01

A spaceborne experiment to study the influence of space factors on the growth of E. coli cultivated with and without antibiotics is outlined. Cultures are placed in 0g conditions, 1g centrifuge and Earth control laboratory. After innoculation of cultures by breaking glass ampules filled with bacterial suspension, the cultures grow for 24 hr at 37 C. After this period the cultures are stocked at 4 C until recovery. Author (ESA)

N83-31294# Paris VI Univ. (France). Lab. de Pathologie Cellulaire.

EFFECTS OF LOW GRAVITY ON MAMMALIAN CELL POLARIZATION AT THE ULTRASTRUCTURAL LEVEL

M. Bouteille, M. Gregoire, F. Bard, C. A. Bourgeois, A. M. Dupuy-Coin, D. Hemon, and G. Geraud *In* ESA Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 41-43 refs (For primary document see N83-31285 19-51)

Avail: NTIS HC A07/MF A01

Spaceborne investigation of changes due to gravity in the ultrastructure of highly polarized, suspended plasma cells is proposed. Statistical analysis of random sections, goniometry, and three dimensional reconstruction of serial sections are used to demonstrate the three dimensional character of cell organization. The effects of 1g force on cell structure can be compared with the effects of all forces ensuring molecular cohesion in living cells, and with the effects of structures such as the cytoskeleton. The role of gravity in the evolution of life on Earth at the cell level can be examined. Author (ESA)

N83-31295# Bern Univ. (Switzerland). Inst. of Pathology.

THE PROBLEM OF LONG-TERM FUNCTION OF NEUTROPHILS IN STUDIES ON THE EFFECTS OF GRAVITY ON MOTILITY, SHAPE AND STRUCTURE OF LOCOMOTOR CELLS

A. Zimmermann, H. U. Keller, and H. Cottier *In* ESA Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 45-48 refs Sponsored by Swiss National Science Foundation and Krebsliga (For primary document see N83-31285 19-51)

Avail: NTIS HC A07/MF A01

The polarization of neutrophils under conditions imposed by the Spacelab Biorack schedule was investigated, since neutrophils are to be used to: test whether spherical cells in suspension can polarize in response to external stimulation in a nongradient situation; study the position and distribution of intracellular organelles; and assess the vigor and coordination of crawling-like movements under microgravity. Polarization and locomotor responses decrease with storage time at 4 C and preincubation at 37 C. Maintenance of these functions is not improved by increasing the buffer capacity of the medium, addition of vitamins, pyruvate and nonessential amino acids or dihydroxybenzoic acid, or by lowering cell concentration. Author (ESA)

N83-31296# Paris VI Univ. (France). Lab. de Cytologie et Morphogenese Vegetales.

GRAVIPERCEPTION, MITOTIC ACTIVITY AND CELL DIFFERENTIATION IN LENTIL SEEDLING ROOTS

Gerald Perbal, Nicole Darbelley, Dominique Driss-Ecole, and Georges Salle *In* ESA Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 49-52 refs (For primary document see N83-31285 19-51)

Avail: NTIS HC A07/MF A01

A spaceborne investigation of the role of the endoplasmic reticulum-amyloplasts (er-a) complex in the perception of gravity and the effects of microgravity on cell differentiation and meristematic activity in lentil roots is proposed. One group of seedlings is grown in microgravity, one in a 1g centrifuge with the roots growing in the direction of centrifugal acceleration. A third group is cultivated in 0g and placed on the centrifuge for 3hr to see if the plants are still able to respond to a 1g acceleration. Root orientation, root growth, mitotic activity, cell differentiation, statocyte ultrastructure, and er-a complex ultrastructure are examined. Author (ESA)

N83-31297# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Inst. for Aerospace Medecine.

PHYSARUM POLYCEPHALUM: CONTRACTION BEHAVIOR, DIRECTION AND VELOCITY OF PROTOPLASMIC STREAMING IN NEAR WEIGHTLESSNESS

V. Sobick and I. Block *In* ESA Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 53-56 refs (For primary document see N83-31285 19-51)

Avail: NTIS HC A07/MF A01

A Spacelab Biorack investigation of cell sensitivity to acceleration stimuli, using the slime mold Physarum polycephalum, is outlined. In order to analyze a significant but transient decrease in period duration of the strand's radial activity during 0 g simulation, and the velocity increase of the protoplasmic streaming (shuttle streaming) up to the termination of the 0 g simulation, under microgravity conditions, special hardware was developed. It consists of sub sample containers, a glove box microscope

combined with a photodiode system (for measuring the strand's radial activity) and a cinecamera (for registration of the velocity and direction of the shuttle streaming). Author (ESA)

N83-31298# Eidgenoessische Technische Hochschule, Zurich (Switzerland). Lab. fuer Biochemie.

EXPERIMENT A08/32/CH: EFFECT OF SPACE FLIGHT ON LYMPHOCYTE ACTIVATION c52

A. Cogoli and A. Tschopp *In* ESA Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 57-61 refs Sponsored by Solco Basel AG and GIBCO (For primary document see N83-31285 19-51)

(Grant SNSF-3.034-0.81)

Avail: NTIS HC A07/MF A01

A Spacelab Biorack investigation of lymphocyte activation is outlined. Lymphocytes in blood samples withdrawn from the flight crew prior, during, and after flight are exposed to the mitogen Con A and cultured in vitro. Cell proliferation, protein biosynthesis, and ultrastructure are determined. The adaptation of the immune response to the stress of spaceflight, the differentiation of cells cultured at low-g, and methods for bioprocessing in space are tested. The hypothesis that low-g depresses lymphocyte activation whereas high-g has a stimulatory effect is challenged.

Author (ESA)

N83-31299# Technische Universitaet, Munich (West Germany). Inst. fuer Botanisches.

SOMATIC EMBRYOGENESIS IN ANISE (PIMPINELLA ANISUM L.) CELL CULTURES IN MICROGRAVITY ENVIRONMENT

Reinhold A. Kudielka and Roland R. Theimer *In* ESA Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 63-68 refs Sponsored by Bundesministerium fuer Forschung und Technologie (For primary document see N83-31285 19-51)

Avail: NTIS HC A07/MF A01

A Spacelab Biorack investigation of the regeneration of dedifferentiated anise cell aggregates is outlined. Every 24 hr aliquots are transferred to embryogenic growth medium under microgravity conditions to induce somatic embryogenesis. During the 7 day period of the mission the cell aggregates differentiate into torpedo shaped embryoids via globular and heart shaped embryo forms. After return, embryoids in each stage of differentiation are recovered and intact anise plants are regenerated. These and part of the embryoids are examined using morphological, biochemical and physiological methods. The data are compared to those obtained with plant material differentiated under simulated Spacelab conditions in 1 g environment on Earth. Author (ESA)

N83-31300# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Inst. for Aerospace Medicine.

THE INFLUENCE OF NEAR WEIGHTLESSNESS CONDITIONS ON THE DEVELOPMENT OF THE VERTEBRATE GRAVITY SENSING SYSTEM: STATEX EXPERIMENT SPACELAB MISSION D1

J. Neubert, W. Briegleb, and A. Schatz *In* ESA Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 69-74 refs (For primary document see N83-31285 19-51)

Avail: NTIS HC A07/MF A01

The test facility of the Spacelab frog statolith experiment on the effect of weightlessness on embryo and tadpole development, is described. The experimental unit (EU) houses sample containers with growing embryos and tadpoles. A 1g reference centrifuge is mounted inside the EU for control experiments. The tadpoles feed off algae; for slight algae growth, diode illumination is used. The inner walls of the EU are coated with water imbibed cellulose. The EU atmosphere is enriched with 40% oxygen. The EU is stored at 10 C during ascent and descent in order to slow down the metabolism and reduce acceleration and vibration effects.

Author (ESA)

N83-31301# Pavia Univ. (Italy). Dept. of Genetics and Microbiology.

EFFECTS OF MICROGRAVITY ON THE MECHANISMS FOR GENETIC RECOMBINATION

O. Ciferri, M. Sosio, A. M. Orlandoni, O. Tiboni, and P. G. Mazza *In* ESA Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 75-76 refs Sponsored by CNR Piano Spaziale Nazionale (For primary document see N83-31285 19-51)

Avail: NTIS HC A07/MF A01

Spacelab Biorack investigation of the effect of microgravity on the transfer of DNA from cell to cell in bacterial cells undergoing conjugation, transduction, or transformation is outlined. The activity of the cell membrane and the interactions cell/cell, cell/bacteriophage, and cell/DNA, are studied. Author (ESA)

N83-31302# Koninklijke Nederlandse Akademie van Wetenschappen, Utrecht. Hubrecht Lab.

THE ROLE OF GRAVITY IN THE ESTABLISHMENT OF THE DORSO-VENTRAL AXIS IN THE DEVELOPING AMPHIBIAN EMBRYO

G. A. Ubbels, T. G. Brom, H. P. Willemsen (Centrum voor Constructie en Mechanisatie, Nuenen, Netherlands), and J. J. H. vanNunen (Centrum voor Constructie en Mechanisatie, Nuenen, Netherlands) *In* ESA Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 77-82 refs Sponsored by Netherlands Agency for Aerospace Programs (NIVR) (For primary document see N83-31285 19-51)

Avail: NTIS HC A07/MF A01

The establishment of polarities in early embryogenesis is discussed. Centrifuge experiments in Xenopus laevis eggs show that gravitationally induced rearrangements of the yolk predictably determine the orientation of the dorso-ventral axis of the embryo, regardless of the original position of the sperm entry point or the gray crescent. This suggests a role of gravitation in the determination of bilateral symmetry. Preparatory experiments and the development of an automatic experiment container for fertilization and fixation of Xenopus eggs for a Biorack investigation of this suggestion are described. Author (ESA)

N83-31303# Universidad Autonoma de Madrid, Cantoblanco (Spain). Dept. de Bioquimica.

THE POSSIBLE INVOLVEMENT OF GRAVITATIONAL FORCES IN THE TOPOLOGICAL DISTRIBUTION OF CYTOPLASMIC DETERMINANTS IN DROSOPHILA MELANOGASTER EMBRYOS

Roberto Marco, Isabel Vernos, Margarita Cervera, and Alberto Domingo *In* ESA Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 83-87 refs Sponsored by Spanish Ministry of Defense, Ministry of Education and Ministry of Health (For primary document see N83-31285 19-51)

Avail: NTIS HC A07/MF A01

A Spacelab Biorack investigation of the involvement of gravitational forces in the shaping of the topological distribution of the maternal information in the early embryo is outlined. Correlation of developmental abnormality with microgravity conditions during oogenesis is examined. Eggs laid at the start of the flight are compared with others layed during, and immediately after, the mission. Vitellogenesis is suggested as the development stage most sensitive to gravitational effects, with the cytoskeletal network of the oocyte maintaining the topological organization of the cytoplasmic determinants in the early embryo. Author (ESA)

N83-31304# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany).

BIORACK EXPERIMENT A08/19 D: DOSIMETRIC MAPPING INSIDE BIORACK

H. Buecker, O. C. Allkofer (Kiel Univ.), R. Beaujean ((Kiel Univ.), W. Enge (Kiel Univ.), R. Facius, H. Francois (Atomic Energy Commission, France), W. Heinrich (Siegen Univ., West Germany), G. Horneck, R. Pfohl (CNR, Strasbourg), G. Portal (Atomic Energy Commission, France) et al *In* ESA Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 89-91 refs (For primary document see N83-31285 19-51)

Avail: NTIS HC A07/MF A01

A Spacelab experiment which documents the radiation environment inside Biorack is outlined. Experimental data are compared

with those of other spaceflights and with theoretical predictions, to provide radiation baseline data for the other Biorack experiments. Six type 1 containers housing stacks of radiation detectors (cellulose nitrate, lexan, CR 39, nuclear emulsions, AgCl, and LiF-thermoluminescence dosimeters) are accommodated in the incubators of Biorack. Author (ESA)

N83-31305# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany).

EXPERIMENT A08/18 D ON BIORACK: EMBRYOGENESIS AND ORGANOGENESIS OF CARAUSIUS MOROSUS UNDER SPACEFLIGHT CONDITIONS

H. Buecker, H. Francois (Atomic Energy Commission, France), E. H. Graul (Marburg Univ., West Germany), W. Heinrich (Siegen Univ., West Germany), H. Hoeffken (Marburg Univ., West Germany), G. Horneck, G. Reitz, W. Ruether (Marburg Univ., West Germany), R. Pfohl (CNR, Strasbourg), G. Portal (Atomic Energy Commission, France) et al *In* ESA Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 93-96 refs (For primary document see N83-31285 19-51)

Avail: NTIS HC A07/MF A01

A Spacelab experiment on the effects of heavy ions on living organisms is outlined. The influence of particles with high charge z and energy loss, of cosmic radiation and microgravity, on embryogenesis and organogenesis of insects is studied in Carausius morosus eggs. Five different stages of development, which differ in radiation sensitivity and regenerative capacity are used. The eggs, in monolayers, are sandwiched between visual track detectors. Results give information on: the effect of heavy ions of cosmic radiation on developmental processes in insects; disturbances of differentiation processes by microgravity; and combined effects of radiation and microgravity. Author (ESA)

N83-31306# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Inst. for Aerospace Medicine.

THE CLINOSTAT: A TOOL FOR ANALYZING THE INFLUENCE OF ACCELERATION ON SOLID-LIQUID SYSTEMS

W. Briegleb *In* ESA Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 97-101 refs (For primary document see N83-31285 19-51)

Avail: NTIS HC A07/MF A01

The use of the fast clinostat is outlined. A platform rotates about a horizontal axis. Near the center of rotation a stiff, closed cuvette filled with a liquid suspension of particles is mounted. Depending on the density difference between the particles and the liquid and on the viscosity of the liquid, particles may settle within circular trails. These trails become points if the speed of rotation of the clinostat increases; the particles become motionless in respect to gravity. Instead of gravity centrifugal forces become effective. But within microscopic dimensions the influence of the centrifugal force on particles can be balanced by Brownian movement. For typical cell systems the degree of 0 g simulation is 100%. From experiments with different cell systems on clinostats, indications for regulatory reactions of different cell parameters during 0 g simulation are obtained. Author (ESA)

N83-31307# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Inst. for Aerospace Medicine.

PROBLEMS OF 0G SIMULATION WITH THE FAST RUNNING CLINOSTAT **c35**

A. Schatz *In* ESA Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 103-105 refs (For primary document see N83-31285 19-51)

Avail: NTIS HC A07/MF A01

The theoretical background of the 0 g simulation technique with the fast clinostat is presented together with the parameters and limitations on biological systems for selection. Interaction with the Earth magnetic field which might introduce effects in addition to those of microgravity are considered. In membranes considered as capacitance, polarization can change permeability by displacements of the conductive plates. Chemically activated membranes can be affected if transmitter molecules are of low molecular weight and can be separated from their proper sites. Author (ESA)

N83-31308# Bonn Univ. (West Germany). Inst. of Botany.

THE USE OF HORIZONTAL CLINOSTATS IN PLANT PHYSIOLOGY

W. Hensel *In* ESA Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 107-108 refs Sponsored by Bundesministerium fuer Forschung und Technologie (For primary document see N83-31285 19-51)

Avail: NTIS HC A07/MF A01

The use of slow rotating clinostats (e.g.2 rpm) in experiments on gravitropism is discussed. If normal grown roots are subjected to clinostat rotation for 20 hr, ultrastructural response of statocytes, delay in graviresponse, increase in ethylene production and shortening of the cycle time of root meristem are caused. These effects can be avoided if plants develop on the clinostat from onset of soaking of the seeds. Only under these specific conditions do clinostats simulate physiological 0 g, and can be used without too many restrictions. Author (ESA)

N83-31309# Eidgenoessische Technische Hochschule, Zurich (Switzerland). Lab. fuer Biochemie.

INFLUENCE OF GRAVITY ON CELL GROWTH AND MIGRATION

A. Tschopp and A. Cogoli *In* ESA Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 109-114 refs (For primary document see N83-31285 19-51)

(Grant SNSF-3.034-0.81)

Avail: NTIS HC A07/MF A01

Ground based investigations of gravitational effects are summarized. When HeLa cells, chicken embryo fibroblasts, sarcoma Galliera cells, Friend leukemia virus transformed cells and human lymphocytes are cultured in a hypergravitational field (10 g) growth rate is increased by 20 to 30%, whereas glucose consumption per cell is lower than at 1 g. Tracking of cell movements on gold coated substrates reveals that cell migration is hindered at high g. Results suggest that under gravitational stress the cell is either capable of shifting to other metabolic pathways and/or consumes less energy at high g than at 1 g. Author (ESA)

N83-31310# Army Research Inst. of Environmental Medicine, Natick, Mass.

VENTILATORY RESPONSE TO CO2 REBREATHING AFTER ADRENERGIC BLOCKADE IN GOATS

Steven E. Weinberger (Beth Israel Hospital), Ronald A. Gabel, Richard A. Steinbrook, David E. Leith, Richard Harris, and Vladimir Fencl 25 Feb. 1983 24 p refs Presented at the 66th Ann. Meeting of the Federation of American Soc. for Expti. Biol., 1982 (DA Proj. 3E1-61102-BS-10)

(AD-A126279; USARIEM-M-10/83) Avail: NTIS HC A02/MF A01 CSCL 06/15

Administration of adrenergic agonists enhances resting ventilation and increases responsiveness to CO2 inhalation, though there are conflicting data about the effect of adrenergic blockade on ventilatory responses. In this study, we investigated the effect of alpha- or beta-adrenergic blockade on the ventilatory response to hyperoxic CO2 rebreathing in awake goats. Five goats were studied before and after intravenous administration of phentolamine (3.8 mg bolus followed by 0.19 mg/min) or propranolol (0.15 mg/kg). Adequacy of alpha- or beta-adrenergc blockade was subsequently demonstrated by assessing the pressor response to norepinephrine or the heart rate response to isoproterenol, respectively. There was no difference (compared to control studies) in the mean slope, x-intercept, or ventilation at end-tidal PCO2 = 70 torr for the C02 response curves after the goats had received either phentolamine or propranolol. When mean inspiratory flow rate (VT/Ti) was plotted against end-tidal PCO2, there was also no change in slope x-intercept or VT/Ti at end-tidal PCO2 = 70 torr after the goats had received propranolol. GRA

N83-31311# California Univ., Los Angeles. Dept. of Chemistry.
ENERGY CAPTURE AND USE IN PLANTS AND BACTERIA
P. D. Boyer Oct. 1982 7 p
(Contract DE-AT03-76ER-70102)
(DE83-010009; DOE/ER-70102/T1) Avail: NTIS HC A02/MF A01

Predictions of the binding change mechanism of ATP synthesis in photophosphorylation and oxidative phosphorylation was evaluated. Important areas of progress were made on the characterization of a deactivated state of the chloroplast ATP synthase that results when chloroplast thylakoid membranes are deenergized, and probes of labeling patterns of bound nucleotides. These give further evidence that both catalytic and noncatalytic tightly bound nucleotides are present. A second important phase of research was characterization of the patterns of oxygen exchange accompanying the synthesis of ATP with various nucleoside diphosphate substrates and the hydrolysis of ATP by purified CF1 ATPase with various nucleoside triphosphate substrates. These point to similar mechanisms with all nucleotides. DOE

N83-31312# Midwest Research Inst., Golden, Colo. Biotechnolyg Branch.
FERMENTATION OF SOLUBLE CELLO-OLIGOSACCHARIDES BY YEAST
Stanley M. Lastick, Diane D. Spindler, and Karel Grohmann Feb. 1983 14 p refs Presented at the Natl. Meeting of the Am. Chem. Soc., Kansas City, Mo., 16-17 Sep. 1982
(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)
(DE83-007317; SERI/TP-232-1733; CONF-820909-18) Avail: NTIS HC A02/MF A01

Yeast strains that ferment cellobiose were examined with respect to fermentation on soluble cellodextrin preparations. Hydrolysis of the fermentation products was followed using thin layer chromatography, Candida and Brettanomyces sp. hydrolyze cellobiose and, at a much lower rate, cellotriose, indicating the presence of beta-glucosidase (EC 3.2.1.21) activity. Enzyme asseys conducted on B. clausenii fermentations indicated that the beta-glucosidase remained cell associated during fermentation. Torulopsis sp. hydrolyzed all of the cello-oligo-saccharides, indicating exoglucanase (EC 3.2.1.91) activity. The exogluconanase, a glycoprotein with an apparent molecular weight of .00084 daltons, is exported into the culture medium. DOE

N83-31313# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Applied Mathematics.
ASYMPTOTIC METHODS IN MATHEMATICAL BIOLOGY
J. Grasman Oct. 1982 23 p refs Submitted for publication
(MC-TW-227/82) Avail: NTIS HC A02/MF A01

Asymptotic methods for differential equation models of physiological and ecological phenoma are reviewed. Hopf bifurcation, almost linear oscillations, relaxation oscillations, nonlinear reaction-diffusion and the change in stability of an ecological system due to periodic forcing are discussed. Author (ESA)

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N83-31314 Royal Signals and Radar Establishment, Malvern (England).
EYE MOVEMENTS AND VISUAL SEARCH: A BIBLIOGRAPHY
K. T. Carr, E. D. Megaw, and P. J. Goillau Jan. 1983 88 p refs (RSRE-MEMO-3543; BR87847) Copyright. Avail: Issuing Activity

Over 700 references concerning work related to eye movements and visual search are listed and qualified using a keyword system. The bibliography is intended for research on visual search for military targets viewed through electro-optical imaging systems. Author (ESA)

N83-31315# Research Inst. of National Defence, Stockholm (Sweden).
REPORT BY A PARTICIPANT IN THE SEVENTH ANNUAL CONGRESS OF THE EUROPEAN UNDERSEA BIOMEDICAL SOCIETY AND SYMPOSIUM ON DECOMPRESSION SICKNESS
Hans Oernhagen Sep. 1981 26 p In SWEDISH Symp. held in Cambridge, England, 21-24 Jul. 1981
(FOA-C-58009-H1) Avail: NTIS HC A03/MF A01

Subjects discussed at the biomedical conference on decompression sickness are reported. Some of the presented topics include: safety training and accident analysis of aquatic scientists; relationships between chest dimensions and pulmonary barotrauma; physiological effects on divers; biochemical and hematological responses; schedules for saturation decomposition to establish principles; deep heliox dive decompression; low frequency hearing loss, effects of repetitive diving; biochemical and hematological findings in decompression sickness; compression/decompression project; pulsed Doppler method to study hemodynamic changes and bubbles. Transl. by E.A.K.

N83-31316*# National Aeronautics and Space Administration, Washington, D. C.
EFFECT OF LOW TEMPERATURES ON OSSEROUS AND CARTILAGINOUS TISSUES
Ye. Ya. Pankov, G. A. Babiychuk, S. V. Malyshkina, and A. I. Zhigun Mar. 1983 14 p refs Transl. into ENGLISH from "Vozdeystrviye Nizkikh Temperatur na Kostnuyu i Khryashchevuyu Tkani" (USSR), Ortopediya, Travmatol. i Protezirovaniye, no. 4, Apr 1981 p 75-78 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prepared by Kharkov Inst. of Orthopedics and Traumatology
(Contract NASw-3541)
(NASA-TM-77201; NAS 1.15:77201) Avail: NTIS HC A02/MF A01 CSCL 06P

The use of extreme cold to treat tumoral afflictions of the extremities is discussed. Cryogenic methods and instruments are discussed, and the levels of accumulated knowledge in this area (as well as the areas still in question) are evaluated. The overall promise for cryogenic methods of treatment is acknowledged, and areas which need further development are noted. Author

N83-31317# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.
A STUDY OF LOW LEVEL LASER RETINAL DAMAGE Annual Progress Report, 1 May 1981 - 31 Dec. 1982
Bernard F. Hochheimer 15 Mar. 1983 141 p refs
(Contract N00024-83-C-5301)
(AD-A127340; RC-RCS-030) Avail: NTIS HC A07/MF A01 CSCL 20/5

The general objective of this program is to document changes in the retina due to very low laser irradiation. We have two primary aims. One is to develop and improve methods that can be used, in vivo, to objectively determine changes that occur in the retina from laser irradiation. The second is to determine the mechanisms that causes these retinal changes. During this past year we have: Modified our equipment to do small retinal area reflectivity, measurements; Measured the internal light scatter in the eye for wavelengths from 450 to 850 mm; Measured many fluorescence parameters after a single injection of fluorescence; Accurate measurements of spectral reflectivities of small areas of a laser damaged monkey retina and they have been proven to be feasible; Perfected a photographic technique to improve the resolution and contrast of fluorescence angiograms; and Recommended several dyes for use as dyed tear films for retinal protection from laser radiation. GRA

N83-31318# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
TACTILE RECOGNITION AND LOCALIZATION USING OBJECT MODELS: THE CASE OF POLYHEDRA ON A PLANE
Peter C. Gaston and Tomas Lozano-Perez Mar. 1983 23 p refs
(Contracts N00014-81-K-0494; N00014-80-C-0505; N00014-82-K-0334)

(AD-A127228; AI-M-705) Avail: NTIS HC A02/MF A01 CSCL 14/2

This paper discusses how data from multiple tactile sensors may be used to identify and locate one object, from among a set of known objects. The authors use only local information from sensors: the position of contact points, and ranges of surface normals at the contact points. The recognition and localization process is structured as the development and pruning of tree of consistent hypotheses about pairings between contact points and object surfaces. In this paper, they deal with polyhedral objects constrained to lie on a known plane, i.e., having three degrees of positioning freedom relative to the sensors. Author (GRA)

N83-31319# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.

REAL-TIME DETECTION OF STEADY-STATE EVOKED POTENTIALS Interim Report

John G. Nelson and Leonid Hrebien Jul. 1982 15 p refs Presented at the COMPED 82, Philadelphia, 22 Sep. 1982

(WR04101001)

(AD-A126896; NADC-82206-60) Avail: NTIS HC A02/MF A01 CSCL 06/19

In order to use the visual evoked potential as a real-time monitor of the state of the visual system, a monitoring technique was developed to maximize the signal-to-noise (S/N) ratio. System response parameters (co-power, phase angle, and coherence) are estimated for each subject from an ensemble of FFT's during a pre-testing period. These parameters are then used to calculate a weighting function which is used in real-time to perform amplitude normalization, coordinate rotation, and optimal weighting of the terms of individual FFT's. These terms, when summed, produce a simple real variable with maximal S/N and an expected value of 100 for normal vision and zero for no vision or blackout. This technique has been implemented with an FFT signal analyzer and a desk-top computer. Experimental results for six subjects indicate that a useable measure may be achieved. While improvements in the method are required if we are to have an effective real-time monitor for visual functioning, such improvements are not only possible, but feasible. Optimization of variables such as lead placement and stimulus timing promise the required improvement. Author (GRA)

N83-31320# Army Research Inst. of Environmental Medicine, Natick, Mass.

STRENGTH AND CYCLE TIME OF VENTILATORY OSCILLATIONS IN UNACCLIMATIZED HUMANS AT HIGH ALTITUDE

Thomas B. Waggener, Paul J. Brusil, Richard E. Kronauer, Ronald A. Gabel, and Gideon F. Inbar 4 Mar. 1983 27 p refs

(Contracts PHS-2-R01-HL1635-02; PHS-1-F22-01254-02)

(AD-A126288; USARIEM-M-11/83) Avail: NTIS HC A03/MF A01 CSCL 06/19

Respiration was monitored with magnetometers in 12 healthy supine young adults at sea level, and in an altitude chamber at simulated high altitudes ooof 8,000, 9,000, 11,000 and 14,000 feet. Periodic breathing which was strong enough to include apnea at the time of minimum ventilation was seen in all subjects at high altitude. The cycle time of periodic breathing ranged from 12 to 34 seconds. On average across the population the incidence of periodic breathing increased with altitude. The cycle time of the periodic pattern increased as the strength of the pattern increased. After normalizing to a standard pattern strength, cycle time decreased as altitude increased. The study was repeated 3 weeks later on 7 of the subjects. The standard cycle time at 14,000 feet of each subject in the second series was the same as in the first series to within, on the average, 6%. Each subject studied at 11,000 feet in both series reproduced his cycle time to within, on the average, 9%. The variation of standard cycle time for a given subject is less than the variation across the population, indicating characteristic cycle times for some individuals (one-way ANOVA, P less than 0.025). GRA

N83-31321# Army Research Inst. of Environmental Medicine, Natick, Mass.

HYDRATION AND VASCULAR FLUID SHIFTS DURING EXERCISE IN THE HEAT

Michael N. Sawka, Ralph P. Francesconi, Nancy A. Pimental, and Kent B. Pandolf Mar. 1983 22 p refs

(DA Proj. 3E1-62777-A-879)

(AD-A126287; USARIEM-M-12/83) Avail: NTIS HC A02/MF A01 CSCL 06/19

This study examined the effects of hypohydration on plasma volume and red cell volume during rest in a comfortable (20 C, 40% rh) and exercise in a hot-dry (49 C, 20% rh) environment. Twelve subjects completed two test sessions following a 10-day heat acclimation program. One test session was completed when subjects were euhydrated and the other when hypohydrated (-5% from baseline body weight). The test sessions consisted of rest for 30 min in a 20 C antechamber, followed by two 25-min bouts of treadmill walking in the heat, interceded by 10 min of rest. At rest, hypohydration elicited a 5% decrease in plasma volume with less than 1% change in red cell volume. During exercise, plasma volume increased by 4% when subjects were euhydrated and decreased by 4% when hypohydrated. While red cell volume remained fairly constant during the euhydration test, these values were lower when hypohydrated during exercise. We conclude that hydration level alters vasculars fluid shifts during exercise in a hot environment: hemodilution occurs when euhydrated and homoconcentration hypohydrated. GRA

N83-31322# Army Research Inst. of Environmental Medicine, Natick, Mass.

OVERUSE INJURIES OF THE LOWER EXTREMITIES ASSOCIATED WITH MARCHING, JOGGING AND RUNNING

Bruce H. Jones 29 Nov. 1982 21 p refs

(DA Proj. 3E1-62777-A-879)

(AD-A126278; USARIEM-M-9/83) Avail: NTIS HC A02/MF A01 CSCL 06/5

While no large definitive studies have been done, the available literature suggests that overuse injuries are a significant problem for the military. Several approaches to this problem are suggested. These include progressive increases in weight-bearing physical training, taking into account initial fitness levels, and wearing adequately supportive footwear, such as a well designed running shoe. Adequately supportive, lightweight footwear may be even more crucial during the early phases of training while the foundations of strength and stamina are being established. Every other day running or marching during the early phases of physical training, to insure adequate physiologic recovery would also seem advisable. This is important because without adequate recovery training effects will be diminished, while the risk of injury will increase. Furthermore, it seems clear that women are more likely to be injured than men. Whether the large discrepancy injuries between males and females is secondary to inherent anatomic and physiologic differences or some other factor, such as lower level of initial fitness, is not yet established. For this reason no special remedial program can be prescribed for women at this time, except to initiate physical training at modest levels and build-up gradually. Author (GRA)

N83-31323# Naval Biodynamics Lab., New Orleans, La. Bureau of Medicine and Surgery.

PROBLEMS OF MEASUREMENT IN HUMAN ANALOG RESEARCH

Leonard S. Lustick, H. Gerald Williamson, Marjorie R. Seeman, and James M. Bartholomew May 1982 42 p refs Presented at the 8th Ann. Intern. Workshop on Human Subjects for Biomed. Res., Troy, Mich., 14 Oct. 1980

(AD-A126145; NBDL-82R012) Avail: NTIS HC A03/MF A01 CSCL 06/19

The Naval Biodynamics Laboratory in New Orleans is involved in a continuing effort to describe the kinematic and physiological response of anatomical segments of human volunteers to acceleration environments. The scope of this presentation is to discuss some of the problems that arise in the measurement of the three dimensional dynamic response of human volunteers to relatively short duration (250 millisecond) acceleration profiles. With pre-

selection of accelerometers and careful calibration procedures six accelerometer configurations can provide results which agree well with photo-derived results at the velocity level in the time window of interest (250 milliseconds) for the acceleration profiles. With pre-selection of accelerometers and careful calibration procedures six accelerometer configurations can provide results which agree well with photo-derived results of the velocity level in the time window of interest (250 milliseconds) for the acceleration profiles investigated at the NBDL. Accelerometer-derived kinematic variables are best at the acceleration level and photo-derived variables are best at the displacement level and thought should be given to combining results of these two measuring systems into one consistent set of kinematic variables from the acceleration to the displacement level. Author (GRA)

N83-31324# Harvard Univ., Cambridge, Mass. Energy and Environmental Policy Center.
ANALYSIS OF HEALTH EFFECTS RESULTING FROM POPULATION EXPOSURES TO AMBIENT PARTICULATE MATTER, APPENDICES Annual Progress Report, 16 Jul. 1982 - 15 Mar. 1983
14 Mar. 1983 163 p
(Contract DE-AC02-81EV-10731)
(DE83-008538; DOE/EV-10731/T1) Avail: NTIS HC A08/MF A01

The health effects from exposure to ambient particulate matter are studied. Solvent effects on the evaluation of the mutagenic activity of airborne particulates, an evaluation of the health effects of particles based on occupational data, and the results of a time-series analysis of daily mortality in New York are among the topics discussed. DOE

N83-31325# CGR Koch und Sterzel G.m.b.H. Co., Essen (West Germany).
DEVELOPMENT OF A COMPUTERIZED ULTRASONIC SECTOR SCAN SYSTEM FOR INTRACRANIAL DIAGNOSIS Final Report, Dec. 1981
Rudolf Hauke, Dietmar Demuth, and Friedrich Luz Bonn Bundesministerium fuer Forschung und Technologie Mar. 1983 147 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie Prepared in cooperation with Dusseldorf Univ.
(BMFT-FB-T-83-012; ISSN-0340-7608) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 31

Ultrasound and computed tomographic adult brain imaging are compared. First clinical results in vitro and in vivo of a computerized neurosonograph prove that multimode linear array systems are capable of intracranial imaging through the limited aperture in skull and that the resolution compares very well with X-ray scanners. Author (ESA)

N83-31326# Bonn Univ. (West Germany). Inst. fuer Klinische und Experimentelle Nuklearmedizin.
DEVELOPMENT OF A MOBILE GAMMA CAMERA COMPUTER SYSTEM FOR NONINVASIVE VENTRICULAR FUNCTION DETERMINATION Final Report, Dec. 1981
Reinhold Knopp, Sven Norbert Reske, and Cuno Winkler Bonn Bundesministerium fuer Forschung und Technologie Mar. 1983 19 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-017; ISSN-0340-7608) Avail: NTIS HC A02/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 4

A compact scintigraphic system consisting of a mobile gamma camera with a conductive built-in minicomputer (16 bit, 128 kB) is described. It renders possible a combined investigation of ventricular volume and pressure. The volume curve is acquired by sequential scintigraphy whereas the pressure is simultaneously measured manometrically by a heart catheter. A pressure-volume loop is plotted, the enclosed area of which represents the cardiac work performance. Functional parameters such a compliance (dV/dp) and stiffness (dp/dV) can be derived from the loop diagram. The mobile system can also be used for detection of acute infarctions. Author (ESA)

N83-30449# Joint Publications Research Service, Arlington, Va.
FURTHER COMMENTARY ON BIOMEDICAL STUDIES BY SOYUZ T-6 CREW
B. Konovalov *In its* USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 10-12 Transl. into ENGLISH from Izv. (Moscow), 29 Jun. 1982 p 2 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

N83-30714# Birmingham Polytechnic, Perry Barr (England). Dept. of Mechanical and Production Engineering.
BIO-DYNAMIC RESPONSE OF HUMAN HEAD DURING WHOLE-BODY VIBRATION CONDITIONS
B. K. N. Rao *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 3 May 1982 p 89-99 refs Sponsored in part by SERC (For primary document see N83-30709 19-31)
Avail: NTIS HC A12/MF A01 CSCL 06/16

N83-30759# New Mexico State Univ., Las Cruces. Physical Science Lab.
ANGULAR ACCELERATION MEASUREMENT ERRORS INDUCED BY LINEAR ACCELEROMETER CROSS-AXIS COUPLING
Anthony S. Hu *In* Shock and Vibration Information Center The Shock and Vibration Bull., no. 50, part 2 Sep. 1980 p 11-16 refs 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 06B

N83-31227 Southwest Research Inst., San Antonio, Tex.
DEVELOPMENT OF A HUMAN ELECTROSTATIC DISCHARGE MODEL IN RELATION TO ELECTRONIC SYSTEMS
William W. Byrne *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 20 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31293# Toulouse Univ. (France). Faculte de Medecine.
STUDY OF ANTIBACTERIAL ACTIVITY OF ANTIBIOTICS IN SPACE CONDITIONS
R. Tixador, G. Richoilley, G. Gasset, N. Moatti, L. Lapchine, and J. Raffin (CNES, Toulouse) *In* ESA Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 37-39 refs (For primary document see N83-31285 19-51)
Avail: NTIS HC A07/MF A01

N83-31298# Eidgenoessische Technische Hochschule, Zurich (Switzerland). Lab. fuer Biochemie.
EXPERIMENT A08/32/CH: EFFECT OF SPACE FLIGHT ON LYMPHOCYTE ACTIVATION
A. Cogoli and A. Tschopp *In* ESA Space Biol. with Emphasis on Cell and Develop. Biol. May 1983 p 57-61 refs Sponsored by Solco Basel AG and GIBCO (For primary document see N83-31285 19-51)
(Grant SNSF-3.034-0.81)
Avail: NTIS HC A07/MF A01

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N83-31327# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
FIRM MINIMUM
I. Maximov 15 Feb. 1983 13 p Transl. into ENGLISH from Krasnaya Zvezda (USSR), no. 80, 1968 p 2
(AD-A126971; FTD-ID(RS)T-1642-82) Avail: NTIS

HC A02/MF A01 CSCL 05/9
Marxist-Leninist ideology at a Soviet air academy is discussed.
Author

N83-31328# Human Performance Technologies, Inc., Thousand Oaks, Calif.
PEER-REVIEW STUDY OF THE DRAFT HANDBOOK FOR HUMAN-RELIABILITY ANALYSIS WITH EMPHASIS ON NUCLEAR-PLANT APPLICATIONS, NUREG/CR-1278
R. L. Brune, M. Weinstein, and M. E. Fitzwater Jan. 1983 231 p (Contract DE-AC04-76DP-00789)
(DE83-007377; SAND-82-7056) Avail: NTIS HC A11/MF A01

The extent peers agree with the human behavior models and estimates of human error probabilities are determined. Twenty-nine human factors experts participated in the study. Twenty of the participants were Americans; nine were from other countries. The peers performed human reliability analyses of a variety of human performance scenarios describing operator activities in nuclear power plant settings. They also answered questionnaires pertaining to the contents and application of the Handbook. An analysis of peer solutions to the human reliability analysis problems and peer responses to the questionnaire was performed. Recommendations regarding the format and contents of the Handbook were developed from the study findings. DOE

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N83-31329 Royal Signals and Radar Establishment, Malvern (England).
THE PROCESSES OF VISUAL PERCEPTION AND THE IMPLICATIONS FOR OPTIMISATION OF DISPLAYS
R. Home Feb. 1983 81 p refs
(RSRE-83001; BR87645) Copyright. Avail: Issuing Activity

Performance data on the human visual system are summarized. Measurement of visual acuity, contrast sensitivity, form perception, color vision, dynamic effects (single pulse, flickering, moving stimuli) and visual noise is outlined. Parametric requirements for display design are listed. Author (ESA)

N83-31330# Research Inst. of National Defence, Stockholm (Sweden).
WILD PLANTS AS FOOD DURING A 250 KM SURVIVAL MARCH
Stefan Kaellman Jan. 1983 32 p refs In SWEDISH; ENGLISH summary
(FOA-C-54044-H1) Avail: NTIS HC A03/MF A01

A 250 km long survival march was performed with a minimum of equipment and with wild plants as food. Samples were collected five times and glucose and free fatty acids in the blood and ketone bodies in the urine were determined. Author

N83-31331# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. Dept. of Electrical Engineering.
AN ANDROID RESEARCH AND DEVELOPMENT PROGRAM M.S. Thesis
Roslyn J. Taylor Mar. 1983 149 p refs
(AD-A127359; AFIT/GE/EE/83M-3) Avail: NTIS HC A07/MF A01 CSCL 15/5

This report identifies areas requiring further research to develop a detailed research and development plan for an aircraft maintenance android. The general user requirements are defined and the desired android capabilities are addressed to meet the defined user requirements. The user requirements are defined independently of aircraft type. Structured analysis diagrams are used to describe the functional requirements. Specific recommendations are made. Author (GRA)

N83-31332# Naval Submarine Medical Research Lab., Groton, Conn.
COLD WEATHER GOGGLES. PART 4: OPTIMAL DENSITY Interim Report
S. M. Luria 3 Mar. 1983 17 p refs
(AD-A127427; NSMRL-996) Avail: NTIS HC A02/MF A01 CSCL 06/17

Light- and dark-eyed observers, ranging in age from 17 to 67, compared six pairs of sunglasses whose neutral density filters transmitted either 0.8, 2.5, 4.8, 8.9, 15.8, or 91.2% of the light. The sunglasses were worn in bright sunlight both in summer and winter and rated for comfort as to the light-level which they admitted to the eyes. In addition, the observers took a test of resolution acuity with each pair of filters. Observers of both eye-colors and of every age-group preferred, on the average, sunglasses which reduced the light-level to 300-400 footcandles. These preferred filters are much denser than typical commercial sunglasses. Resolution acuity declined significantly for the older observers with filters denser than the preferred ones. Author (GRA)

N83-31333# Sandia Labs., Albuquerque, N. Mex.
NRC HUMAN-RELIABILITY RESEARCH PROGRAM
R. R. Prairie and A. D. Swain 1982 7 p refs Presented at the 10th Water Reactor Safety Res. Information Conf., Gaithersburg, Md., 12 Oct. 1982
(Contract DE-AC04-76DP-00789)
(DE83-001284; SAND-82-2252C; CONF-821037-4) Avail: NTIS HC A02/MF A01

The human reliability research program supported by the Division of facility Operations is described and very briefly mentions other work supported by the NRC. All of the work for NRC is related directly or indirectly to the safety assessment of light water reactors. DOE

N83-31334# Steinbock G.m.b.H., Moosburg (West Germany).
REDUCTION OF NOISE AND VIBRATION ON FORK LIFT TRUCKS Final Report, Dec. 1980
Peter Bartels, Heinrich Dupuis, Premysl Jenik, and Guenter Tronich Bonn Bundesministerium fuer Forschung und Technologie Mar. 1983 136 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-HA-83-010; ISSN-0171-7618) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 28,50

A prototype 2.5 t diesel fork lift truck is described. A reduction of the medium noise level as per DIN 45635, T. 36 (70% of the nominal rotation speed) at the driver's ear of 10,0 dB (A) to 77.5 dB (A), and reduction of vibration of 50% to 65% measured at the driver's seat are achieved. Author (ESA)

N83-30451# Joint Publications Research Service, Arlington, Va.
NEW FOOD SELECTION SYSTEM FOR COSMONAUTS IN SALYUT-7
B. Konovalov *In its* USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 15-16 Transl. into ENGLISH from Izv. (Moscow), 3 Jun. 1982 p 6 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering.*

N83-31335*# Kentron Technical Center, Hampton, Va.
SPP: A DATA BASE PROCESSOR DATA COMMUNICATIONS PROTOCOL Final Report
Paul A. Fishwick May 1983 72 p
(Contract NAS1-16000)
(NASA-CR-172144; NAS 1.26:172144) Avail: NTIS HC A04/MF A01 CSCL 09B

The design and implementation of a data communications protocol for the Intel Data Base Processor (DBP) is defined. The protocol is termed SPP (Service Port Protocol) since it enables data transfer between the host computer and the DBP service port. The protocol implementation is extensible in that it is explicitly layered and the protocol functionality is hierarchically organized. Extensive trace and performance capabilities have been supplied with the protocol software to permit optional efficient monitoring of the data transfer between the host and the Intel data base processor. Machine independence was considered to be an important attribute during the design and implementation of SPP. The protocol source is fully commented and is included in Appendix A of this report. Author

N83-31336# Rapp Systems Corp., Xenia, Ohio.
COMPUTER OPERATING SYSTEM MAINTENANCE Final Report, Jul. 1980 Dec. 1981
Wesley B. Corvey and Tod A. Rapp Wright-Patterson AFB, Ohio AFWAL Jun. 1982 24 p
(Contract F33615-80-C-2053; AF Proj. 3066)
(AD-A126963; AFWAL-TR-82-2061) Avail: NTIS HC A02/MF A01 CSCL 09/2

With the acquisition of data analysis system for the Compressor Research Facility (CRF), the Aero Propulsion Laboratory included an IBM 370 computer system which functions as an integral part of CRF data processing. The IBM 370/155 provides: pre-test database storage and modification facilities; on-line data reduction, analysis and storage; as well as post-test data re-processing. This contractual effort enhanced the 370/155 operating system by providing: Time Share Option modifications, Performance and Usage monitoring, Trade Studies, Share modifications, System Problem Identification, Operating System maintenance, Security modifications, Program Product maintenance, and Computer Management Information Facilities. The result of the effort is documented in this final Technical Report. Author (GRA)

N83-31337# Naval Postgraduate School, Monterey, Calif. Dept. of Computer Science.
THE INTEL 432/670 AND ADA PERFORMANCE BENCHMARKS M.S. Thesis
David James Applegate and Robert Abbott Coates Dec. 1982 152 p refs
(AD-A126887) Avail: NTIS HC A08/MF A01 CSCL 09/2

The INTEL 432/670 microcomputer system contains the iAPX-432 microprocessor which executes compiled Ada programs. The compiler resides on a host VAX 11/780, and compiled programs are downloaded to an INTEL MDS 800 system where they are transferred to the 432/670 for execution. This thesis describes a preliminary performance evaluation of the INTEL 432/670 through the use of selected benchmark algorithms from the Computer Family Architecture (CFA) study. A description of the hardware components of both the MDS 800 and 432/670 is provided, including the modifications made to the operating system to allow compatibility with existing hardware. Additionally, the benchmark program source code and a user's manual are appended. Author (GRA)

N83-31338# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
PRELIMINARY DESIGN AND IMPLEMENTATION OF A METHOD FOR VALIDATING EVOLVING ADA COMPILERS M.S. Thesis
Edward D. Miller, Jr. Mar. 1983 15 p refs
(AD-A127333; AFIT/GCS/MA/83M-1) Avail: NTIS HC A02/MF A01 CSCL 09/2

This project consisted of a preliminary design and a partial implementation of a tool which modifies the existing Ada Compiler Validation Capability (ACVC) test set so it can be used to test evolving Ada compilers. The project evaluated the feasibility of repackaging each of test classes found in the ACVC and suggested methods for repackaging the tests. The tool developed uses a table-driven parser which parses the July 1980 proposed standard. In uses output from the parser to generate a representation of a test program. Once the representation is developed, unsupported language-features are removed from it. The remaining representation is output as a valid test program. Author (GRA)

N83-31339# Naval Postgraduate School, Monterey, Calif. Dept. of Administrative Sciences.
A COST-PERFORMANCE ANALYSIS OF COMPUTER ALTERNATIVES M.S. Thesis
Gladys Twining Connolly Dec. 1982 68 p refs
(AD-A127312) Avail: NTIS HC A04/MF A01 CSCL 05/1

This study contains an application of cost-performance analysis to the automation of a manual reporting and record-keeping system. A small local transit company serves as the basis for the analysis. Beginning with a brief history of small business computing and computers in the transit industry, it covers the main aspects of requirements analysis in terms of system size, software and hardware. Four alternative computer systems, two minicomputers and two microcomputer networks, are presented and rated on their responsiveness to the transit company's needs. Tradeoffs in cost and performance are analyzed to determine the marginal costs for each unit of increase in performance. The cost-performance techniques developed for mainframe systems are shown to be applicable to minicomputer and a microcomputer based systems as well. Author (GRA)

N83-31340# Naval Postgraduate School, Monterey, Calif. Dept. of Administrative Sciences.
MICROCOMPUTER MICROECONOMICS M.S. Thesis
Mark Alan Doernhoefer Dec. 1982 65 p refs
(AD-A127305) Avail: NTIS HC A04/MF A01 CSCL 09/2

This paper outlines the procedures for an economic analysis of a microcomputer system designed for personal use. It provides a methodology for application identification and quantification of the benefits derived from the applications. Empirical decision rules are suggested for the key decisions of quantity and mix of software, start-up and cessation timing, and resource allocation. These rules are based upon analysis of marginal opportunities gained and foregone over the lifecycle of the system. Particular emphasis is placed upon the role of software in the economics of the system. Economies of scale and sensitivity analysis are also discussed. The thesis serves as a structured beginning for further research into microcomputer system modelling. GRA

N83-31341# University of Southern California, Marina del Rey. Information Sciences Inst.
A RESEARCH PROGRAM IN COMPUTER TECHNOLOGY Annual Technical Report, 1 Jul. 1981 - 30 Jun. 1982
Keith W. Uncapher Mar. 1983 137 p refs

(Contract MDA903-81-C-0335; ARPA Order 4242)
(AD-A127288; ISI/SR-83-23) Avail: NTIS HC A07/MF A01 CSCL 09/2

This report summarizes the research performed by USC/Information Sciences Institute from July 1, 1981, to June 30, 1982, for the Defense Advanced Research Projects Agency. The research applies computer science and technology to areas of high DoD/military impact. The ISI program consists of thirteen research areas: Cooperative Interactive Systems; Mapping Designs Between Language Levels; Specification Acquisition From Experts; VLSI--Services and Research; Internetwork Concepts Research; Command Graphics; Wideband Communication; Formal Semantics; QPRIM; Interlisp; Strategic C3 System Experiment Support; New Computing Environment; and Computer Research Support. GRA

N83-31225 Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.
MONITORS FOR UPSET DETECTION IN COMPUTER SYSTEMS
M. E. Schmid, R. L. Trapp, G. M. Masson (Johns Hopkins Univ.), and A. E. Davidoff *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 15 p refs (For primary document see N83-31163 19-47)
(Contract N00024-81-C-5301)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

N83-31233* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DIGITAL SYSTEM UPSET: THE EFFECTS OF SIMULATED LIGHTNING-INDUCED TRANSIENTS ON A GENERAL PURPOSE MICROPROCESSOR
Celeste Belcastro *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 12 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00 CSCL 09B

N83-31235* Johns Hopkins Univ., Baltimore, Md. Dept. of Electrical Engineering and Computer Science.
UPSET EXPERIMENTATION IN COMPUTER-BASED SYSTEMS
Gerald M. Masson *In* FAA Eighth Intern. Aerospace and Ground Conf. on Lightning and Static Elec. Jun. 1983 9 p refs (For primary document see N83-31163 19-47)
Avail: IALC-8, FAA Technical Center, ACT-340, Atlantic City, N.J. $25.00

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N83-31342# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
IMAGE PROCESSING, PATTERN RECOGNITION AND ROBOT VISION [PROCESSAMENTO DE IMAGENS, CLASSIFICACAO DE PADROES E VISAO ROBOTICA]
Nelson D. A. Mascarenhas and Flavio R. D. Velasco May 1983 16 p refs In PORTUGUESE; ENGLISH summary Presented at the 1st Natl. Congr. on Ind. Automation, 11-15 Jul. 1983
(INPE-2731-PRE/313) Avail: NTIS HC A02/MF A01

The main aspects of current activities in the areas of image processing, pattern classification and robotics vision are summarized. Author

N83-31343*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
NIMBUS-7 ERB MATGEN SCIENCE DOCUMENT
Harold V. Soule Apr. 1983 135 p refs Prepared in cooperation with Research and Data Systems, Inc., Lanham, Maryland
(NASA-TM-84985; NAS 1.15:84985) Avail: NTIS HC A07/MF A01 CSCL 09B

The ERB algorithms and computer software data flow used to convert sensor data into equivalent radiometric data are described in detail. The NIMBUS satellite location, orientation and sensor orientation algorithms are given. The computer housekeeping and data flow and sensor/data status algorithms are also given. Author

N83-31344# Maryland Univ., College Park. Dept. of Computer Science.
STEP-WISE DEBUGGING
Dick Hamlet (Melbourne Univ.) Dec. 1982 13 p refs
(Contract F49620-80-C-0001; AF Proj. 2304)
(AD-A127338; AFOSR-83-0309TR; TR-82/16) Avail: NTIS HC A02/MF A01 CSCL 09/2

Programs written using step-wise refinement are meant to be understood at levels of an hierarchy, but only a complete program can be executed. This paper considers the debugging of such programs in the manner they are written: top-down, each level not depending on execution of the levels below. Step-wise debugging also applies to the testing of multiple-process systems, and to the integration testing of any software. It allows the debugging of incomplete software, and when all modules are available, it structures debugging to follow the conceptual organization of the software. Author (GRA)

N83-31345# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
ROBOT PROGRAMMING
Tomas Lozano-Perez Dec. 1982 59 p refs
(Contracts N00014-81-K-0494; N00014-80-C-0505; N00014-82-K-0334)
(AD-A127233; AI-M-698) Avail: NTIS HC A04/MF A01 CSCL 09/2

The industrial robot's principal advantage over traditional automation is programmability. Robots can perform arbitrary sequences of pre-stored motions or of motions computed as functions of sensory input. This paper reviews requirements for and developments in robot programming systems. The key requirements for robot programming systems examined in the paper are in the areas of sensing, world modeling, motion specification, flow of control, and programming support. Existing and proposed robot programming systems fall into three broad categories: guiding systems in which the user leads a robot through the motions to be performed, robot-level programming systems in which the user writes a computer program specifying motion and sensing, and task-level programming systems in which the user writes a computer program specifying motion and sensing, and task-level programming systems in which the user specifies operations by their desired effect on objects. A representative sample of systems in each of these categories is surveyed in the paper. Author (GRA)

N83-31346# Naval Research Lab., Washington, D. C.
A MICROCOMPUTER-BASED SAMPLING DIGITAL VOLTMETER
Richard E. Scott, Jr. and James D. George 31 Mar. 1983 109 p refs
(AD-A126980; NRL-MR-4872) Avail: NTIS HC A06/MF A01 CSCL 14/2

This report describes a sampling digital voltmeter developed at the Underwater Sound Reference Detachment of the Naval Research Laboratory. It consists of a PDP-11/23 microcomputer with up to three channels of analog-to-digital converters capable of making simultaneous measurements on pulsed or continuous sinusoids at frequencies up to 100 kHz. The voltmeters is controlled by ASCII commands on the IEEE-488 bus. Statistical parameters (mean, peak, standard deviation, and second joint moment) are computed using numerical integration. Sinusoidal parameters (amplitude, phase, and harmonic distortion) are computed using single-frequency discrete Fourier transforms (SFDFT). The digital filtering resulting from the use of the SFDFT can be further enhanced by optional data sequence weighting (multiplying the

sequence by a given windowing sequency). Computation times may be reduced by optional subsequence averaging. Complete assembly language listings for the voltmeter program are included and described. GRA

N83-31347# Naval Postgraduate School, Monterey, Calif.
ANALYSIS OF THE RELATIONAL DATA BASE MODEL IN SUPPORT OF AN INTEGRATED APPLICATION SOFTWARE SYSTEM M.S. Thesis
Rodney Nishimura Dec. 1982 131 p refs
(AD-A126979) Avail: NTIS HC A07/MF A01 CSCL 09/2

The premise of this thesis is that many software application systems perform similar functions on a data object and contain a significant operational intersection. An Integrated Application Software System (IASS) integrates the capabilities of the applications into one system. The purpose of this thesis is to evaluate the utility of the relational database model to conceptually integrate the text processing, relational database management, form generating, electronic mail, and electronic modeling applications. The conclusion of this study is that the relational database model can conceptually support the data representation and manipulation requirements of each application considered. Furthermore, the integrated system has potential capabilities that are not available in the non-integrated set of applications. Author (GRA)

N83-31348# Melbourne Univ., Parkville (Australia). Dept. of Computer Science.
TESTING OF CONCURRENT PROGRAMS AND PARTIAL SPECIFICATIONS
Dick Hamlet Dec. 1982 16 p refs
(Contract F49620-80-C-0001; AF Proj. 2304)
(AD-A127330; TR-82/13; AFOSR-83-0306TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

The testing problems of concurrent systems include those of sequential programs, but there are two additional difficulties: the scheduling of tasks may alter the behavior, making tests misleading; testing may be conducted at an early stage of development, by users who are not software experts. Concurrent process systems can be modeled by a collection of finite-state transducers, in a way that displays their unique problems. The specification languages PAISLey and Gist approach the definition of concurrent systems differently, but both permit users to execute partially defined systems. The declarative language PROLOG, although not explicitly designed for concurrent programming, exhibits similar characteristics. Prototype execution has some unexpected implications for testing, and for final implementation. GRA

N83-31349# Naval Postgraduate School, Monterey, Calif. Dept. of Electrical Engineering.
INTERACTIVE MICROCOMPUTER CONTROL SYSTEM MODELING AND REALIZATION USING A DATABASE FOR AUTOMATIC PROGRAMMING M.S. Thesis
Roger Francis Johnsrud Dec. 1982 118 p refs
(AD-A126847) Avail: NTIS HC A06/MF A01 CSCL 09/2

A program for control system modeling, simulation, and realization useable by the novice programmer was developed for interactive use on a microcomputer. The program uses two software packages; PL/1-80 and DBASE II. The paper covers a complete example for modeling and simulation of a minimum time response ripple free controller for a plant. The program uses two sample rates, one for modeling the computer and the other for modeling the plant. Variable delays due to computer computation are included and corrected semi-transparent to the control designer. This thesis covers two different fields of interest, one for the experienced control system designer yet a novice programmer, and the other for the novice control designer yet an experienced computer programmer. Key programming concepts include using a bussiness database to automatically program a control problem requiring a scientific language. Author (GRA)

N83-31350# Naval Health Research Center, San Diego, Calif. Biological Sciences Dept.
NON-LINEAR REGRESSION ANALYSIS: A GENERAL PROGRAM FOR DATA MODELING USING PERSONAL MICROCOMPUTERS Final Report
Dennis P. Nelson and Louis D. Homer (Naval Medical Research Inst.) Feb. 1983 36 p refs
(DA Proj. 3M1-62770-A-871)
(AD-A126840; NAVHLTHRSCHC-83-5) Avail: NTIS HC A03/MF A01 CSCL 09/2

This report documents a general non-linear regression program for fitting data to non-linear models. The program is based on an algorithm which uses a least squares criterion to calculate successive improvements to an initial set of parameter estimates. The program is written in the BASIC language common to most microcomputers, because it is easy to use and to transport between machines from different manufacturers. The majority of inexpensive microcomputers do not offer matrix operations as part of their BASIC interpreter. The program presented here, therefore, supplies subroutines in BASIC for the zeroing, transposing and inverting of the required matrices, to make it compatible with most microcomputers available today. The report gives examples and program output based on a demonstration data set involving antigen-antibody complexation in solution. Two derivations of function subroutines are given to assist the user in developing his own functions. A complete listing of the necessary programs is given along with a section on program cautious. GRA

N83-31351# Naval Ship Research and Development Center, Bethesda, Md. Computation, Mathematics and Logistics Dept.
GPRIM/GGEN INTERACTIVE FINITE ELEMENT DATA GENERATOR Final Report
Dolores R. Wallace and James M. McKee Mar. 1983 88 p refs
(SF43411391; SF43422250)
(AD-A127163; DTNSRDC-83/021) Avail: NTIS HC A05/MF A01 CSCL 09/2

The GPRIME/GGEN interactive general finite element data generator is a computer software system which generates finite-element models from GPRIME geometric descriptions of structures. GGEN permits interactive generation of two-dimensional elements with uniform or non-uniform meshes, with user options on node and element numbering. The user may create these data in large quantity with a single keyboard command, or in smaller groups or singly either by keyboard command or graphic control. Nodes and elements may be changed or deleted with either keyboard commands or cursor controls. Display features include scaling, translations, and rotations as well as selection of items to be displayed. The output file consists of grid point data coordinates and element connection data. Error messages are designed to enable the user to recover from errors and to continue the GGEN process. The GGEN data generator is designed as an applications program using the GPRIME geometric language and language processor. GPRIME features available at any time during the GGEN modeling process include GPRIME processing of changes, print options, HELP messages, new geometry, access to existing geometry, viewing options, and restart capability. GRA

N83-31352# Naval Postgraduate School, Monterey, Calif. Dept. of Computer Science.
A HEURISTIC FOR DECOMPOSING A PROBLEM INTO A SEQUENCE OF SUBPROBLEMS M.S. Thesis
Donald Vincent Evans Dec. 1982 104 p refs
(AD-A127417) Avail: NTIS HC A06/MF A01 CSCL 09/2

This thesis presents a method for decomposing a specification of a problem into a sequence of subproblem specifications. The method uses the specification to build a tree-like structure called a semantic net. The net is then used to construct a sequence of subspecifications. Each subspecification of the sequence represents a subproblem. Composition of the solution to the subproblems results in a solution to the given problem specification. In this work, the author presents an intuitive approach to what Artificial Intelligence and program synthesis is, defines the sequence problem associated with program synthesis, and presents the method for deriving a sequence of subspecifications. When this has been done, the method is then applied to a specific problem domain called the Blocks World. They then consider the method

in a non-Blocks World domain and follow with a summary.
Author (GRA)

N83-31353# Los Alamos Scientific Lab., N. Mex.
GUIDE TO MAPPER PRESENTATION GRAPHICS
T. Ruhe Feb. 1983 53 p refs
(Contract W-7405-eng-36)
(DE83-009373; LA-9617-MS) Avail: NTIS HC A04/MF A01

Important, high-quality visual aids for presentations may be made easily with the MAPPER graphics utility. The focus of discussion is on making simple, but often important, text slides quickly and easily. A detailed discussion of methods to access alternate alphabet capabilities also is presented. Subsequent brief introductions to drawing and color capabilities are given. Important tips on use and presentation methods make up the final section. Appendixes of sample results and system primers are included.
DOE

N83-31354# California Univ., Livermore. Lawrence Livermore Lab.
QUIKIE: A PLOTTING ROUTINE TO PRODUCE QUICK AND EASY GRAPHS. REFERENCE MANUAL
Robert E. Strout, II Feb. 1983 22 p refs
(Contract W-7405-eng-48)
(DE83-009356; UCID-19681) Avail: NTIS HC A02/MF A01

QUIKIE is a plotting routine to produce quick and easy two-dimensional data graphs. QUIKIE allows the user to produce basic black and white or color graphs and display them on a TMDS monitor. The capability for production of presentation quality graphs is also provided. The user may overlay two or more data sets upon the same graph, allowing comparison or validation of the data. Graphic information is stored in a UX80 plot-file which can then be sent for processing to a RJET printer, TMDS monitor, high resolution hardcopy or viewgraph, or FR80/DICOMED generated film.
DOE

N83-31355# California Univ., Livermore. Lawrence Livermore Lab.
LANGUAGE ISSUES IN PROGRAMMING ENVIRONMENTS
M. Blattner and D. Zimmerman 1983 13 p refs Presented at Symp. on Principles of Programming Languages, Austin, Tex., 24 Jan. 1982
(Contract W-7405-eng-48)
(DE83-022062; UCRL-88004; CONF-830105-1) Avail: NTIS HC A02/MF A01

When planning an automated programming support environment, questions concerning language design arise. In this paper we consider problems such as why language related issues occur, what is the nature of these questions, and how the software life cycle affects language structures; in addition, we consider how language problems in environments impact the target language of the programming support environment. We define the programming life cycle as a series of models of the system to be developed. These models are represented by data structures and languages. We propose a set of language building mechanisms called semantic frames or S-frames that will assist in developing the models and languages required for the programming support environment.
DOE

N83-31356# Research Inst. of National Defence, Stockholm (Sweden).
EXPERIMENTAL COMPARISON OF SOME TYPES OF DATA INPUT DIALOGUES [EXPERIMENTAL JAEMFOERELSE AV DIALOGTYPER FOER DATAINMATNING]
Kerstin Severinson Eklundh and Carl-Erik Hedin Feb. 1983 28 p refs In SWEDISH; ENGLISH summary
(FOA-C-5311-H2) Avail: NTIS HC A03/MF A01

Operator performance with three types of man-computer dialogue for terminal input of numerical data were evaluated: question-answer, form-based, and command dialogues. Results show a strong interaction between dialogue type and type of data. The form-based dialogue is most effective for input of large records of ordered data, while the command dialogue is superior for unordered data. Subjects prefer an interaction pattern that optimizes speed at the cost of less feedback and less possibility of error control. This does not, however, lead to a higher error rate.
Author (ESA)

N83-31357# Oxford Univ. (England). Engineering Lab.
THE GRLIB: A GRAPHICS LIBRARY FOR THE RETROGRAPHICS VT100 TERMINAL
N. C. Baines and D. G. Henshaw Oct. 1982 18 p
(OUEL-1428/82) Avail: NTIS HC A02/MF A01

A development of the Tektronix plotting package TXGLIB for use with the retrographics VT100 terminals is described. The subroutines that send specific control characters, draw vectors and points are presented. Software character generation and graph plotting subroutines are outlined. Tektronix compatibility, compatibility with other terminals and examples of use are considered.
Author (ESA)

N83-31358# Oxford Univ. (England). Engineering Lab.
INTRODUCTION TO THE EXTENDED SYSTEM MODELLING PROGRAM ESMP
D. W. Clarke 1983 42 p
(OUEL-1448/83) Avail: NTIS HC A03/MF A01

A program which uses digital techniques to simulate the operation of a 130-block analog computer is described. Systems to be simulated are represented using a block diagram notation. A user's guide including the specifications of the system and a summary of the available commands is given. A display facility extension program which gives more flexible data output is also described. The simulation of a Van Der Pool oscillator and a case of spacecraft control are presented. A typical configuration with 50 blocks needs only 10 to 20 sec of computer time, including graphical display generation.
Author (ESA)

N83-31359# Sheffield Univ. (England). Dept. of Control Engineering.
A USER GUIDE TO THE CONTROL SYSTEM IDENTIFICATION AND DESIGN PACKAGE-TRIP
A. S. Morris Nov. 1982 9 p refs
(RR-205) Avail: NTIS HC A02/MF A01

The characteristics and utilization of the TRIP package for single input single output systems are explained. The model types which are available, each having a two letter numeric code, are listed. Entry of a transfer function model, storing models on disks, computing and displaying of system time and frequency response, displaying poles and zeros of transfer function; obtaining the root locus plot and the updating of the system model are described.
Author (ESA)

N83-31360# Trondheim Univ. (Norway). Computing Center.
CHIPSY: THE CHILL INTEGRATED PROGRAMMING SYSTEM
Kristen Rekdal and Svein Olav Hallsteinsen 1982 10 p
(PB83-171066; STF14-A82020) Avail: NTIS HC A02/MF A01 CSCL 09B

CHIPSY is the programming support environment being developed at RUNIT as part of the Nordic CHILL project. The work has been sponsored by the Nordic Telecommunication administrations, British Telecom and industry in Norway and Switzerland. The system is currently hosted on ND-100 computers. CHIPSY is aimed at the development and maintenance of large real-time systems, especially in the area of telecommunications. CHIPSY is made to support the use of CHILL which is the CCITT recommended language for programming telecommunications applications. CHIPSY is a modular toolset based on standard interfaces between the tools. CHIPSY is designed to be portable across a range of host and target computers.
GRA

N83-31361# Purdue Univ., Lafayette, Ind. School of Electrical Engineering.
THEORETICAL RESULTS ON THE PROPERTIES OF MEDIAN TYPE OPERATIONS
T. A. Nodes and Neal C. Gallagher Sep. 1982 162 p refs
(Grants NSF ECS-80-24302; AF-AFOSR-3605-79)

(PB83-164855; TR-EE-82-32; NSF/ECS-82016) Avail: NTIS HC A08/MF A01 CSCL 09B

The multivariate output distribution of one and two dimensional median type operations is developed, and this is used in several illustrative examples of the effects of median filtering signals plus additive white noise. In addition, some of the statistics of signals plus white impulsive noise are presented. The effects of one dimensional median filtering on signal bandwidth are discussed, and optimum root estimators are examined. The structure of two dimensional root signals (signals invariant to filtering) for separable median filters is developed. In addition, it is proved that repeated passes of a separable median filter over any image will reduce it to such a root structure except possibly in rarely occurring regions of time varying binary oscillations when larger windows are used. The form of these nonconvergent exceptions is also examined.

GRA

N83-30474# Indian Space Research Organization, Sriharikota.
SUMMARY OF THE PRESENTATION MADE ON JANUARY 27, 1982 ON INDIAN SPACE RESEARCH ORGANIZATION (ISRO)-DFVLR COOPERATION PROJECT ON COMPUTER NETWORKING

T. Viswanathan *In* DFVLR DFVLR/ISRO Colloq. About a Decade of Cooperation in the Field of Space Res. and Technol. Jan. 1983 p 113-120 refs (For primary document see N83-30466 19-12)

Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 35,20

62 COMPUTER SYSTEMS

Includes computer networks.

N83-31362# Naval Postgraduate School, Monterey, Calif. Dept. of Computer Science.
ALTERATION AND IMPLEMENTATION OF THE CP/M-86 OPERATING SYSTEM FOR A MULTI-USER ENVIRONMENT M.S. Thesis

Thomas V. Almquist and David S. Stevens Dec. 1982 161 p refs

(AD-A126850) Avail: NTIS HC A08/MF A01 CSCL 09/2

CP/M-86 is a single user microcomputer operating system. This thesis provides a multi-user protected CP/M-86 based disk sharing environment memory, and the REMEX Data Warehouse 3200 memory storage unit. The REMEX houses a 14 inch Winchester hard disk and two flexible floppy disk drives providing in excess of 20 megabytes of data storage capacity. The major objective in the design of this system was to create a table-driven CP/M-86 Basic Input/Output System that could be quickly and easily reconfigured to adapt to any new hardware configuration. Once the system was operational, the REMEX hard disk could then serve as a signal processor emulation for the AEGIS system. By making direct calls to the appropriate read/write routines, stored radar data could be retrieved from the hard disk for use by the other system processes. Author (GRA)

N83-31363# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. Dept. of Computer Systems.
DESIGN AND IMPLEMENTATION OF A GENERIC COMPUTER NETWORK SIMULATION SYSTEM M.S. Thesis

Stewart J. Foster Mar. 1983 213 p refs

(AD-A127318; AFIT/GCS/EE/83M-2) Avail: NTIS HC A10/MF A01 CSCL 09/2

A generic approach was used in modeling and simulating computer networks. The primary type of computer networks of interest in this study are characterized by a communications sub-network of nodes which serve host processors. Local area networks are also considered and may be modeled with this program. All models included packet switching and can be characterized as having distributed, ring or bus topology. The top level of the simulation program design is as general as possible. The lower levels of the design are the building blocks of particular models. The simulation program was implemented with Simulation Language for Alternative Modeling (SLAM). The network and discrete event orientation of SLAM were combined in this simulation system. In general, the SLAM network portion models the computer network components and the FORTRAN subroutines provides details which define the protocols of the model. Four computer networks are modeled to demonstrate the simulation system. The system is very general. However, many networks may not be modeled precisely enough for formal validation without further development. Further development of simulation systems such as this should be in the discrete event orientation.

Author (GRA)

N83-31364# Naval Postgraduate School, Monterey, Calif. Dept. of Administrative Sciences.
NETWORK MANAGEMENT OF THE SPLICE COMPUTER NETWORK M.S. Thesis

Craig Eric Opel Dec. 1982 103 p refs

(AD-A126935) Avail: NTIS HC A06/MF A01 CSCL 05/1

This thesis examines the network management functions required for a local computer network. Initially, general management considerations are addressed. These include: problem determination, performance analysis, problem management, change management, configuration management, and operations management. The sidestream, mainstream, centralized, decentralized, and hybrid network monitoring technologies are then discussed. An investigation of network measurement tools and their use in generating management reports is undertaken. The topics of analysis timing, performance measure utilization, and parameter selection are considered. Procedures for detecting, diagnosing and correcting network component failures are presented. Solutions are proposed for problems associated with managing a local computer network-long haul network interface. Finally, a discussion of the mission, objectives, and responsibilities of a local computer network central monitoring site is undertaken. Author (GRA)

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N83-31365 International Center for Mechanical Sciences, Udine (Italy).
SINGULAR PERTURBATIONS IN SYSTEMS AND CONTROL

Mark D. Ardema, ed. (NASA. Ames Research Center) Springer-Verlag 1983 337 p refs Proceedings of a seminar held in Udine, Italy, 1982

(CISM-280; ISBN-3-211-81751-4; ISBN-0-387-81751-4) Copyright. Avail: Issuing Activity

The application of singular perturbation theory to problems in systems and control is addressed. The types of systems considered include linear and nonlinear, discrete and continuous, and stochastic and deterministic. Both ordinary and partial differential equations are covered. For individual titles, see N83-31366 through N83-31377.

N83-31366* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AN INTRODUCTION TO SINGULAR PERTURBATIONS IN NONLINEAR OPTIMAL CONTROL

Mark D. Ardema *In* International Center for Mechanical Sciences Singular Perturbations in Systems and Control 1983 p 1-92 refs (For primary document see N83-31365 19-63)

Avail: Issuing Activity

The formulation and basic theorems of singularly perturbed nonlinear optimal control problems are discussed and the solution of such problems using matched asymptotic expansions is described. M.G.

N83-31367 Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Mathematical Sciences.

ON NONLINEAR OPTIMAL CONTROL PROBLEMS
Robert E. OMalley, Jr. *In* International Center for Mechanical Sciences Singular Perturbations in Systems and Control 1983 p 93-102 refs (For primary document see N83-31365 19-63)
Avail: Issuing Activity

The reduction of nonlinear optimal control problems to two point singularly perturbed boundary value problems constrained by an optimality condition is demonstrated. M.G.

N83-31368 Universite Catholique de Louvain (Belgium). Inst. de Mathematique.
SINGULAR PERTURBATIONS IN NONLINEAR SYSTEMS AND OPTIMAL CONTROL
P. Habets *In* International Center for Mechanical Sciences Singular Perturbations in Systems and Control 1983 p 103-142 refs (For primary document see N83-31365 19-63)
Avail: Issuing Activity

Solutions and existence proofs are computed for a two point boundary value problem derived from the reduction of an optimal control problem. The linear, quasilinear, and nonlinear cases are addressed. M.G.

N83-31369 Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Mathematical Sciences.
SLOW/FAST DECOUPLING: ANALYTICAL AND NUMERICAL ASPECTS
Robert E. OMalley, Jr. *In* International Center for Mechanical Sciences Singular Perturbations in Systems and Control 1983 p 143-160 refs (For primary document see N83-31365 19-63)
Avail: Issuing Activity

The numerical solution of linear two point boundary value problems for vector systems of the form x = A(t)x + b(t) and M sub 0 x(0) + M sub 1 x(1) = c is addressed. Of particular concern are linear systems for which fundamental matrices involve coupled slow and fast dynamics, determined by an n x n dimensional state matrix A(t) which is assumed to have high order derivatives. The existence of rapidly varying solution modes M.G.

N83-31370 Illinois Univ., Urbana. Coordinated Science Lab.
COMPOSITE FEEDBACK CONTROL OF NONLINEAR SINGULARLY PERTURBED SYSTEMS
P. V. Kokotovic and J. H. Chow (General Electric Co., Schenectady, N.Y.) *In* International Center for Mechanical Sciences Singular Perturbations in Systems and Control 1983 p 161-168 refs (For primary document see N83-31365 19-63)
Avail: Issuing Activity

The concept and properties of two time scale composite control are summarized. The composite control method was developed for a nonlinear optimal control problem in which the system is singularly perturbed by the presence of a small positive scalar mu. The method takes advantage of the fact that as mu approaches 0 the slow and fast phenomena separate. Instead of dealing with the full problem directly, the method starts by defining two separate lower dimensional subproblems. The solutions of the two subproblems are combined into a composite control whose stabilizing and near optimal properties can be guaranteed. M.G.

N83-31371 Paris Univ., Dauphine (France).
REGULAR PERTURBATIONS IN OPTIMAL CONTROL
A. Bensoussan *In* International Center for Mechanical Sciences Singular Perturbations in Systems and Control 1983 p 169-184 refs Sponsored in part by DOE Office of Electric Energy Systems (For primary document see N83-31365 19-63)
Avail: Issuing Activity

The treatment of the problem of regular perturbations in optimal control developed by Cruz is extended to include the case with contraints on the control. Asymptotics and the proof of the main result are described. M.G.

N83-31372 Groningen Rijksuniversiteit (Netherlands). Mathematics Inst.
HIGH GAIN FEEDBACK CONTROL SYNTHESIS
Jan C. Willems *In* International Center for Mechanical Sciences Singular Perturbations in Systems and Control 1983 p 185-190 refs (For primary document see N83-31365 19-63)
Avail: Issuing Activity

The theory of 'almost invariant subspaces' is discussed. This theory provides a geometric approach to the synthesis of high gain feedback control and is intimately related to singular perturbations. Application to the disturbance decoupling problem is discussed. M.G.

N83-31373 Michigan State Univ., East Lansing. Dept. of Electrical Engineering and Systems Science.
LINEAR QUADRATIC GAUSSIAN ESTIMATION AND CONTROL OF SINGULARLY PERTURBED SYSTEMS
Hassan K. Khalil *In* International Center for Mechanical Sciences Singular Perturbations in Systems and Control 1983 p 191-214 refs (For primary document see N83-31365 19-63)
Avail: Issuing Activity

Techniques are presented for approximating optimal steady-state solutions of time-invariant-linear-quadratic-Gaussian estimation and control problems for linear singularly perturbed systems. Author

N83-31374 Institut National de Recherche d'Informatique et d'Automatique, Le Chesnay (France).
OPTIMAL CONTROL OF PERTURBED MARKOV CHAINS: THE MULTITIME SCALE CASE
J. P. Quadrat *In* International Center for Mechanical Sciences Singular Perturbations in Systems and Control 1983 p 215-240 refs (For primary document see N83-31365 19-63)
Avail: Issuing Activity

Given a controlled perturbed Markov chain of transition matrix m(u) (epsilon), where epsilon is the perturbation scale and u the control, the solution expansion in epsilon, w (epsilon), of the dynamic programming equation: min(u) [m(u)(epsilon) w (epsilon)+ c(u)(epsilon)] = (1+lambda(epsilon))w(epsilon) is studied. In the equation m(u)(epsilon), c(u) (epsilon), and lambda(epsilon) are polynomials in epsilon. The case lambda (epsilon)=(L) leads to study Markov chains on a time scale of order 1/epsilon(L). The state space and the control set are finite. M.G.

N83-31375 Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Electrcal, Computer, and Systems Engineering.
SINGULAR PERTURBATIONS IN STABLE FEEDBACK CONTROL OF DISTRIBUTED PARAMETER SYSTEMS
Mark J. Balas *In* International Center for Mechanical Sciences Singular Perturbations in Systems and Control 1983 p 241-268 refs (For primary document see N83-31365 19-63)
Avail: Issuing Activity

A singular perturbation formulation of linear time-invariant distributed parameter systems is used to develop a method to design finite-dimensional feedback compensators of any fixed order which will stabilize the infinite-dimensional distributed parameter system. The synthesis conditions are given entirely in terms of a finite-dimensional reduced-order model; the stability results depend on an infinite-dimensional version of the Klimushchev-Krasovskii lemma also presented. M.G.

N83-31376 Ecole Centrale de Lyon (France). Dept. de Mathematiques.
TRANSITION LAYERS, ANGULAR LIMITING SOLUTIONS AND INTERNAL LAYERS IN SINGULARLY PERTURBED NONLINEAR EIGENVALUE PROBLEMS
Claude M. Brauner and Basil Nicolaenko (LASL, N.Mex.) *In* International Center for Mechanical Sciences Singular Perturbations in Systems and Control 1983 p 269-308 refs (For primary document see N83-31365 19-63)
Avail: Issuing Activity

Developments in singular perturbations of nonlinear eivenvalue problems (N.L.E.P.) are surveyed. Nonlinear eigenvalue problems in bounded domains characteristically exhibit multiple solutions; as the eigenvalue parameter varies, connected components of solutions go through bending points (turning points), which mathematically are closely related to bifurcations. Singularly

perturbed nonlinear eigenvalue problems exhibit a wealth of singular limits; including boundary layers, angular limiting solutions, transition layers, internal layers, and free boundary limits. After reviewing basic facts for N.L.E.P.'s, the asymptotic behavior of branches of solutions as a nonlinear eigenvalue parameter goes to infinity is discussed. The close feedback and coupling between the generic multiplicity of solutions of N.L.E.P.'s and the corresponding multiplicity of singular limits is then examined. Typically, the singular limit problems are free boundary problems (F.B.P.) with internal layers centered on the a priori unknown free boundaries; moreover, the free boundaries themselves can exhibit multiplicity, with their bending points (bifurcations) not necessarily related to bending points of the original perturbed N.L.E.P. M.G.

N83-31377 Utrecht State Univ. (Netherlands). Mathematical Inst.
SINGULARLY PERTURBED SYSTEMS OF DIFFUSION TYPE AND FEEDBACK CONTROL
A. vanHarten *In* International Center for Mechanical Sciences Singular Perturbations in Systems and Contol 1983 p 309-337 refs (For primary document see N83-31365 19-63)
Avail: Issuing Activity

Linear systems of a diffusion-type subject to a certain feed-back control mechanism in a situation where the diffusion constant is a small parameter are considered. Such controlled diffusion systems can be found in the context of heating problems or chemical or nuclear reactor design. Distributed as well as boundary control is addressed on the basis of an instantaneous feedback coupling using observations of the state in a finite number of points y(1),...,y(P) in the interior of the domain D. Singluar perturbation techniques are used to analyze the behavior of the solution of a certain controlled problem asymptotically for epsilon approaches 0. M.G.

N83-31378# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
CONTROL SYSTEMS DIGITAL DECENTRALIZED SIMULATION IN AUTONOMOUS SUBSYSTEMS FOR CONCURRENT PROCESSING [SIMULACAO DIGITAL DESCENTRALIZADA DE SISTEMAS DE CONTROLE EM SUBSISTEMAS AUTONOMOS PARA PROCESSAMENTO CONCORRENTE]
Decio Castilho Ceballos Jun. 1983 12 p refs In PORTUGUESE; ENGLISH summary Presented at the 4th Encontrol Nacl. de Autom., Belem, Brazil, 6-13 Jul. 1983
(INPE-2778-PRE/346) Avail: NTIS HC A02/MF A01

Utilization of concurrent processing for the digital simulation of control systems through partitioning in autonomous subsystems is proposed. Each subsystem can send and receive messages. To illustrate the proposed plan, a decentralized simulator for concurrent processing is presented. L.F.M.

N83-31379*# National Aeronautics and Space Administration, Washington, D. C.
AN OVERVIEW OF ARTIFICIAL INTELLIGENCE AND ROBOTICS. VOLUME 1: ARTIFICIAL INTELLIGENCE. PART A: THE CORE INGREDIENTS
William B. Gevarter Jun. 1983 74 p refs Sponsored in part by NBS
(NASA-TM-85836; NAS 1.15:85836; RTC-6) Avail: NTIS HC A04/MF A01 CSCL 09B

Artificial Intelligence (AI) is an emerging technology that has recently attracted considerable attention. Many applications are now under development. The goal of Artificial Intelligence is focused on developing computational approaches to intelligent behavior. This goal is so broad - covering virtually all aspects of human cognitive activity - that substantial confusion has arisen as to the actual nature of AI, its current status and its future capability. This volume, the first in a series of NBS/NASA reports on the subject, attempts to address these concerns. Thus, this report endeavors to clarify what AI is, the foundations on which it rests, the techniques utilized, applications, the participants and, finally, AI's state-of-the-art and future trends. It is anticipated that this report will prove useful to government and private engineering and research managers, potential users, and others who will be affected by this field as it unfolds. Author

N83-31380# Army Materiel Systems Analysis Activity, Aberdeen Proving Ground, Md.
PROCEEDINGS OF THE 4TH MEETING OF THE COORDINATING GROUP ON MODERN CONTROL THEORY, PART 2
Jan. 1983 133 p refs Meeting held in Rochester, Mich., 27-28 Oct. 1982
(DA Proj. 1R6-65706-M-541)
(AD-A126966) Avail: NTIS HC A07/MF A01 CSCL 14/2

Report documents papers presented at fourth meeting of the coordinating group on modern control theory with emphasis on military weapon systems. Author (GRA)

N83-31381# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
RESEARCH IN KNOWLEDGE REPRESENTATION FOR NATURAL LANGUAGE UNDERSTANDING Annual Report, 1 Sep. 1981 - 31 Aug. 1982
William A. Woods, M. Bates, R. Bobrow, B. Goodman, and D. Israel Sep. 1982 63 p refs
(Contract B00014-77-C-0378; ARPA Order 3414)
(AD-A127323; BBN-5188) Avail: NTIS HC A04/MF A01 CSCL 05/7

This ARPA project in Knowledge Representation for Natural Language Understanding is aimed at developing techniques for computer assistance to a decision maker in understanding a complex system or situation using natural language control of an intelligent graphics display. The work in progress falls into three classes: fluent natural language understanding in a graphics context - including helpful systems that go beyond mere passive execution of literal instructions, fundamental problems of knowledge representation and use, and abstract parallel algorithms for knowledge base inferential operations. This report gives a brief summary of the activities of this research project during the past year. In addition, publications, and presentations during the past year are documented. Author (GRA)

N83-31382# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
ADAPTIVE DETECTION THRESHOLD OPTIMIZATION FOR MULTI-TARGET TRACKING IN CLUTTER Progress Report, Feb. 1982 - Jan. 1983
Saul Gelfand, Thomas E. Fortmann, and Yaakov Bar-Shalom 31 Jan. 1983 61 p refs
(Contract N00014-80-C-0270)
(AD-A127159; BBN-5249) Avail: NTIS HC A04/MF A01 CSCL 12/1

The problem of selecting signal processing parameters, particularly detection thresholds, so as to optimize downstream tracking performance is examined further. Numerical simulations are used to establish the validity of certain approximations made previously. These simulations suggest that steady-state analysis is inadequate, and an adaptive threshold optimization scheme is proposed as an alternative. Finally, the original derivation of the Probabilistic Data Association Filter (PDAF), upon which the present work is founded, is augmented to account for finite gate size. Author (GRA)

N83-31383# Brown Univ., Providence, R. I. Center for Dynamical Systems.
PRACTICAL METHODS FOR THE COMPENSATION AND CONTROL OF MULTIVARIABLE SYSTEMS Final Report, 1 Jan. - 31 Dec. 1982
William A. Wolovich and Peter L. Falb Jan. 1983 11 p refs
(Grant AF-AFOSR-0034-82; AF Proj. 2304)
(AD-A127386; AFOSR-83-0299TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The question of deadbeat error control in a multi-input/output configuration was resolved. More specifically, a necessary and sufficient condition was outlined which enables the control designer to construct a feed forward controller which zeros the error between the system output and reference input in a finite number of discrete steps. A constructive algorithm was outlined for generically

achieving a zeroing output feedback control law which requires no dynamic storage registers. A new methodology was developed for adaptively assigning the closed loop poles of both discrete and continuous time linear multivariable systems. The procedure is direct in that a parameterized model of the unknown plant need not be explicity identified. A theoretical relationship between the two polynomial matrices which characterize a transfer matrix factorization was developed and shown to resolve a variety of questions involving polynomial matrices in a direct and efficient manner. M.G.

N83-31384# Sheffield Univ. (England). Dept. of Control Engineering.
SOME CASE STUDIES IN APPROXIMATE MODELS IN MULTIVARIABLE PROCESS CONTROL
D. H. Owens, H. M. Wang, and A. Chotai Nov. 1982 44 p
(Grant SRC-GR/B/23250)
(RR-203) Avail: NTIS HC A03/MF A01

Methods for choosing approximate engineering plant models are given. Simple controllers corresponding to each model are given. Using the given model and controller forms, the stability and performance of the approximate control system are decided. A more general measure of model/real plant mismatch is derived implying a less conservative necessary condition for including integral control action. In one of the examples presented, problems occur due to the bad condition of the steady state matrix. It is shown that even in this case the stability condition has a simple form. Author (ESA)

N83-31385# Sheffield Univ. (England). Dept. of Control Engineering.
DYADIC EXPANSIONS AND MULTIVARIABLE FEEDBACK DESIGN
D. H. Owens Dec. 1982 18 p refs Submitted for publication
(RR-207) Avail: NTIS HC A02/MF A01

The use of dyadic expansions in control design is discussed. The definitions of dyadic systems and the control design procedures are explained. It is shown that even if the plant transfer function matrix is not dyadic, it is possible to associate a dyadic structure or dyadic expansion at a specific frequency. The manipulation of characteristic loci at a specific frequency or over a frequency interval is examined. The dyadic expansion and diagonal dominance, and the method of dyadic expansion when the diagonal dominance condition does not hold are treated. The method of dyadic expansion, the characteristic locus method and the inverse and direct Nyquist array techniques are shown to be reducible into one general design algorithm involving transformations, pre and post compensation, diagonal dominance checks and eigenvalue manipulation and estimation. Author (ESA)

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N83-31386 Royal Signals and Radar Establishment, Malvern (England).
A COMPARISON BETWEEN THE LEAST-SQUARES LATTICE AND FAST KALMAN ALGORITHMS FOR ADAPTIVE CHANNEL EQUALISATION
J. G. McWhirter and T. J. Shepherd Mar. 1983 55 p refs
(RSRE-MEMO-3567; BR87899) Copyright. Avail: Issuing Activity

An exact least squares lattice algorithm for channel equalization is derived without using an explicit time update for the equalizer or predictor coefficients. This avoids the need for auxiliary vectors and scalars within the analysis and facilitates a theoretical comparison with the corresponding fast Kalman algorithm, which is also derived. Both algorithms incorporate a general form of statistical estimator which includes the growing or growing-fading memory estimators and the sliding window estimator as special cases. The Kalman algorithm is marginally more efficient (in terms of arithmetic operations) than the least squares algorithm, but is relatively unstable. The least squares algorithm has desirable numerical properties which arise from the way in which it progressively reduces the residual energy stage-by-stage.
Author (ESA)

N83-31387# Junta de Energia Nuclear, Madrid (Spain).
SOME MATHEMATICAL PROBLEMS IN NON-LINEAR PHYSICS
1983 129 p refs In SPANISH; ENGLISH summary Presented for the Catedra de Fis. Teorica de la Fac. de Cienc. Fis. de la Univ. Complutense de Madrid
(JEN-533; ISSN-0081-3397; ISBN-84-500-8366-4) Avail: NTIS HC A07/MF A01

The main results are the following: (1) a general analysis of nonautonomous conserved densities for simple linear evolution systems; (2) partial differential systems within a wide class are converted into Lagrangian form; (3) rigorous criteria for existence of integrating factor matrices; (4) isolation of all third order evolution equations with highorder symmetries and conservation laws; (5) the finding of new infinite families or nonlinear hamiltonian systems which are completely integrable; (6) construction of a system of functionals in involution with respect to double symplectic structure via Miura transformations and associated Riccati equation; associated with a nonlinear Fokker-Planck equation by Lipatov's method; (8) a rigorous formulation of the scattering of a charged particle by a neutral system with vanishing total dipole moment; and (9) evolution of arbitrary initial data for time dependent quadratic hamiltonians. Author

N83-31388# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A FORMULA FOR CALCULATING LAGRANGE COEFFICIENTS [UMA FORMA PARA O CALCULO DE COEFICIENTES DE LAGRANGE]
Orion deOliveiraSilva and Heber Martin dosSantosDias Apr. 1983 14 p refs In PORTUGUESE; ENGLISH summary Presented at the 3rd Simposio Castelan em Matematica Applicada, em Florianopolis
(INPE-2720-PRE/306) Avail: NTIS HC A02/MF A01

A closed formula for calculating the Lagrange interpolation polynomial coefficients is proposed. Author

N83-31389# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ANALYTICAL SOLUTION OF 1ST AND 2ND ORDER ORDINARY DIFFERENTIAL EQUATIONS USING THE REDUCE 2 ALGEBRA MANIPULATION PROGRAM [SOLUCAO ANALITICA DE EQUACOES DIFERENCIAIS ORDINARIAS DE PRIMEIRA E SEGUNDA ORDEM UTILIZANDO O PROGRAMA DE MANIPULACAO ALGEBRICA REDUCE 2]
Guilherme Bittencourt and Luiz Alberto Vierira Dias Apr. 1983 18 p refs In PORTUGUESE; ENGLISH summary Presented at the 3rd Simposio Castelan em Matematica Applicada, em Florianapolis
(INPE-2719-PRE/305) Avail: NTIS HC A02/MF A01

Computer solutions for differential equations normally are obtained numerically. However, there are cases in which the clarity of a closed form analytical solution presents overwhelming advantages over a table of values. The algebraic manipulation capabilities of REDUCE 2 were explored. In addition to these capabilities, procedures that are able to interpret a given ordinary differential equation, written, as long as possible in the usual mathematical notation are implemented. Using a heuristic algorithm, similar to the way an advanced calculus student would approach the problem, the solution is assembled, according to the best method for each case. Once in integral form, the REDUCE 2 integrator tries to solve it, obtaining an analytical solution formula. Besides finding the solution, the equation is classified (order, linearity, method used, integration factor), and the solution type described (explicit or implicit). Error and follow up messages are activated, as necessary. The input may be by interactive remote terminal or by cards (batch). General first order ordinary differential equations, as found in advanced calculus books, are solved as

well as second order ordinary differential equations with constants coefficients, Euler equations. Author

N83-31390*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CONVERGENCE AND STABILITY PROPERTIES OF MINIMAL POLYNOMIAL AND REDUCED RANK EXTRAPOLATION ALGORITHMS
Avram Sidi (Technion - Israel Inst. of Tech., Haifa) Jul. 1983 27 p refs
(NASA-TM-83443; E-1659; NAS 1.15:83443) Avail: NTIS HC A03/MF A01 CSCL 12A

The minimal polynomial and reduced rank extrapolation algorithms are two acceleration of convergence methods for sequences of vectors. In a recent survey these methods were tested and compared with the scalar, vector, topological epsilon algorithms, and were observed to be more efficient than the latter. It was also observed that the two methods have similar convergence properties. The convergence and stability properties of these methods are analyzed and the performance of the acceleration methods when applied to a class of vector sequences that includes those sequences obtained from systems of linear equations by using matrix iterative methods is discussed. M.G.

N83-31391*# National Aeronautics and Space Administration, Washington, D. C.
MATRIX DIFFERENTIATION FORMULAS
D. A. Usikov and D. K. Tkhabisimov Apr. 1983 13 p refs Transl. into ENGLISH of "Formuly Matrichnogo Differentsirovaniya" (USSR), Pr-755, 1982 p 1-11 Submitted for publication Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prepared by Space Research Inst., Academy of Sciences (USSR), Moscow
(Contract NASw-3542)
(NASA-TM-77210; NAS 1.15:77210; Pr-755) Avail: NTIS HC A02/MF A01 CSCL 12A

A compact differentiation technique (without using indexes) is developed for scalar functions that depend on complex matrix arguments which are combined by operations of complex conjugation, transposition, addition, multiplication, matrix inversion and taking the direct product. The differentiation apparatus is developed in order to simplify the solution of extremum problems of scalar functions of matrix arguments. Author

N83-31392# Stevens Inst. of Tech., Hoboken, N. J.
AN INVESTIGATION OF THE APPLICABILITY OF THE THIRD DEGREE FUNCTIONAL POLYNOMIAL MODEL TO NON-LINEAR SHIP MOTIONS PROBLEMS Final Report, 1 Mar. 1981 - 30 Dec. 1982
J. F. Dalzell Dec. 1982 118 p refs
(Contract N00014-81-K-0231; NR Proj. 230-101)
(AD-A127366; SIT-DL-82-9-2275) Avail: NTIS HC A06/MF A01 CSCL 13/10

The objectives of the present work were to explore the applicability of the third degree functional polynomial model to nonlinear seakeeping problems, and to attempt the development of an approach by which third degree nonlinearities in observed responses of ships to waves might be interpreted. Basic approaches to the deterministic characterization of such systems are discussed, and basic identification theory for the random sea case is developed. The latter involves the estimation of a new entity called the cross-tri-spectrum. Simulations of the response of a system with quadratic and cubic nonlinearities was carried out for random excitation. The qualitative influence of cubic nonlinearities on random time domain response as well as response spectra are discussed. A first attempt was made at cross-tri-spectral identification of cubic response from samples of random excitation and response. Though this attempt was partially successful, the numerical method employed was not satisfactory in an important way and further development is indicated.
Author (GRA)

N83-31393# California Univ., Berkeley. Lawrence Berkeley Lab.
AN ADAPTIVE FINITE DIFFERENCE METHOD FOR HYPERBOLIC SYSTEMS ON ONE SPACE DIMENSION, REVISION
John H. Bolstad Dec. 1982 97 p refs Submitted for publication
(Contracts N00014-75-C-1132; DE-AC03-76SF00098)
(AD-A126874; LBL-13287-Rev) Avail: NTIS HC A05/MF A01 CSCL 12/1

In this paper we develop and partially analyze an adaptive finite difference mesh refinement algorithm for the initial boundary value problem for hyperbolic systems in one space dimension. The method uses clusters uniform grids which can move along with pulses or steep gradients appearing in the calculation, and which are superimposed over a uniform coarse grid. Such refinements are created, destroyed, merged, separated, recursively nested or moved based on estimates of the local truncation error. We use a four-way linked tree and sequentially allocated deques (double-ended queues) to perform these operations efficiently. The local truncation error is estimated using a three-step Richardson extrapolation procedure in the interior of the region, and differences at the boundaries. Our algorithm was implemented using a portable, extensible FORTRAN preprocessor, to which we added records and pointers. The method is applied to two model problems: the second order wave equation with counterstreaming Gaussian pulses, and the Riemann shock-tube problem. For both problems our algorithm is shown to be three to five times more efficient (in computing time) than the use of a uniform coarse mesh, for the same accuracy. GRA

N83-31394# Pennsylvania Univ., Philadelphia. School of Electrical Engineering.
THE BOUNDED p-POINT CLASSES IN ROBUST HYPOTHESIS TESTING AND FILTERING Interim Report
Saleem A. Kassam Oct. 1982 10 p refs Presented at the 20th Ann. Conf. on Commun., Control, and Computing, Allerton, Calif., Oct. 1982
(Grant AF-AFOSR-0022-82; AF Proj. 2304)
(AD-A126865; AFOSR-83-0206TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The bounded p-point classes of density functions are defined through upper and lower bounds on the power or probabilities on different sets in some partition of the frequency or sample space. The robust Wiener filter is derived for such classes, and is shown to be piecewise constant in its frequency response. Similar results are indicated for hypothesis testing and matched filtering involving such classes of densities. GRA

N83-31395# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
IMPLEMENTATION OF A THEORY FOR INFERRING SURFACE SHAPE FROM CONTOURS
Kent A. Stevens Aug. 1982 29 p refs
(Contract N00014-80-C-0505; Grant NSF MCS-79-23110)
(AD-A127285; AI-M-676) Avail: NTIS HC A03/MF A01 CSCL 12/1

Human vision is adept at inferring the shape of a surface from the image of curves lying across the surface. The strongest impression of 3-D shape derives from parallel (but not necessarily equally spaced) contours. In the computational problem of inferring 3-D shape from image configurations is examined, and a theory is given for how the visual system constrains the problem by certain assumptions. The assumptions are three: that neither the viewpoint nor the placement of the physical curves on the surface is misleading, and that the physical curves are lines of curvature across the surface. These assumptions imply that parallel image contours correspond to parallel curves lying across an approximately cylindrical surface. Moreover, lines of curvature on a cylinder are geodesic and planar. These properties provide strong constraint on the local surface orientation. We describe a computational method embodying these geometric constraints that is able to determine the surface orientation even in places where locally it is very weakly constrained, by extrapolating from places where it is strongly constrained. This computation has been implemented, and predicts local surface orientation that closely

matches the apparent orientation. Experiments with the implementation support the theory that our visual interpretation of surface shape from contour assumes the image contours correspond to lines of curvature. Author (GRA)

N83-31396# Princeton Univ., N. J. Lab. for Information Sciences and Systems.
ROBUST AND VECTOR QUANTIZATION Ph.D. Thesis. Technical Progress Report, Feb. 1981 - Aug. 1982
Peter F. Swaszek and John B. Thomas Mar. 1983 119 p refs (Contract N00014-81-K-0146)
(AD-A127258; PR-10) Avail: NTIS HC A06/MF A01 CSCL 12/1

In this report, the authors consider the quantization of random sources. The problem of signal quantizer design under an incomplete statistical description of the source is first considered. It is assumed that a histogram of the source on a finite domain is known. The compandor model for a non-uniform quantizer with a large number of output levels is employed. Both minimum mean and minimax error criteria are investigated leading to the design of piecewise linear compressors. Topics on the partitioning of the histogram are included. For vector quantization, the design of a spherical coordinates quantizer in k dimensions is discussed. Exact and compandor model solutions are derived as is the factorization of the quantization levels to each quantizer. Numerical examples are presented along with asymptotic results. Also investigated is the optimality of polar quantizers with the subsequent development of optimal circularly symmetric quantizers. Examples of these Dirichlet polar quantizers for the bivariate Gaussian source are included and their performance is compared to optimum error rates. The topic of implementation is considered. Author (GRA)

N83-31397# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
VISUAL ALGORITHMS
Tomaso Poggio May 1982 29 p refs
(Contract N00014-75-C-0643; Grants NSF MCS-79-23110; NATO-237.81)
(AD-A127251; AI-M-683) Avail: NTIS HC A03/MF A01 CSCL 12/1

Nonlinear, local and highly parallel algorithms can perform several simple but important visual computations. Specific classes of algorithms can be considered in an abstract way. The author studies the class of polynomial algorithms to exemplify some of the important issues for visual processing like linear vs. nonlinear and local vs. global. Polynomial algorithms are a natural extension of Perceptrons to time dependent grey level images. Although they share most of the limitations of Perceptrons, they are powerful parallel computational devices. Several of their properties are characterized and especially their equivalence with Perceptrons for geometrical figures and the synthesis of nonlinear algorithms (mapping) via associative learning. Finally, the paper considers how algorithms of this type could be implemented in nervous hardware, in terms of synaptic interactions strategically located in a dendritic tree. The implementation of three specific algorithms is briefly outlined: direction sensitive motion detection; detection of discontinuities in the optical flow; and detection and localization of zero-crossings in the convolution of the image with the Laplacian (of a Gaussian). In the appendix, another (nonlinear) differential operator, the second directional derivative along the gradient, is briefly discussed as an alternative to the Laplacian. Author (GRA)

N83-31398# Virginia Univ., Charlottesville. Dept. of Electrical Engineering.
SPLINE FITTING THROUGH PARALLEL PROCESSING
D. Kazakos Apr. 1983 28 p refs
(Contract N00014-82-K-0409)
(AD-A127196; UVA/525379/EE83/102) Avail: NTIS HC A03/MF A01 CSCL 12/1

In many applications there appears the need to represent a set of raw data by fitting to them a smooth function or set of functions. A great amount of theoretical work has been done within the framework of approximation theory in studying properties of curve fitting for various families of approximating functions. One of the most attractive and well structured families of approximating functions are the splines. They have been extensively studied in the mathematical literature. Splines have been very useful in statistics. In the engineering literature, spline functions have been used as approximating tools, in the areas of Systems and Pattern Recognition. In this paper the authors concentrate on a fast, parallel computation technique for fitting a spline to n equispaced data points. Existing techniques can fit splines in 0(n) time, with recursive (serial) processing of the data. The new technique is based on the use of Fast Fourier Transform, and its parallel processing capability. As a result, our technique achieves the fitting of a spline in 0(log sub 2 n) time. The n data points must be equispaced. GRA

N83-31399# Naval Ocean Systems Center, San Diego, Calif.
ADAPTIVE STATE VARIABLE ESTIMATION USING ROBUST SMOOTHING
F. D. Groutage, R. G. Jacquot (Wyoming Univ.), and D. E. Smith (Computer Sciences Corp.) 6 Dec. 1982 30 p refs
(AD-A127433; NOSC/TD-556) Avail: NTIS HC A03/MF A01 CSCL 12/1

The development of a conventional Kalman filter is based on a full knowledge of system a priori information. A problem of concern is that associated with determining the estimates of the state variables of a system from observation data when a full knowledge of some a priori system information is unknown. The information includes a knowledge of noise statistics, system forcing functions, and descriptions of system dynamics. This paper addresses only one of the important aspects of the above problem: state variable estimation in the absence of knowledge about deterministic system forcing functions. A robust estimation concept for weighting certain elements of the Kalman gain and covariance matrices is presented. Robust statistical procedures are used to smooth estimates of the state variables once the estimates are determined by an adaptive Kalman filter. The weights for the elements of the Kalman gain and covariance matrices are functions of the sample means and sample variances of the innovations sequence. A primary application of the techniques presented in this paper is that of determining the estimates of position, velocity, and acceleration of a maneuvering body in three dimensional space from observed data collected by a remote sensor tracking the maneuvering body. GRA

N83-31400# Naval Postgraduate School, Monterey, Calif. Dept. of Mathematics.
THE STRUCTURE OF OPTIMUM INTERPOLATION FUNCTIONS Interim Report for FY 1982
Richard Franke and William J. Gordon (Drexel Univ.) Feb. 1983 35 p refs
(Contract N00228-81-C-K096)
(AD-A126958; NPS53-83-0005) Avail: NTIS HC A03/MF A01 CSCL 12/1

The form of the approximating function obtained by optimum interpolation of meteorological data and related schemes in other disciplines is explored. A variant of Cressman's successive approximation method is shown to be convergent to the same function given by optimum interpolation. GRA

N83-31401# Carnegie-Mellon Univ., Pittsburgh, Pa. Group for Management Sciences Research.
BRANCH AND BOUND METHODS FOR THE TRAVELING SALESMAN PROBLEM
Egon Balas and Paolo Toth (Florence Univ.) Mar. 1983 71 p refs Sponsored in part by the Centro Nazionale delle Ricerche (Contract N00014-75-C-0621; Grant NSF ECS-82-05425; NR Proj. 047-048)
(AD-A126957; MSRR-488) Avail: NTIS HC A04/MF A01 CSCL 12/1

This paper reviews the state of the art in enumerative solution methods for the traveling salesman problem (TSP). The introduction (Section 1) discusses the main ingredients of branch and bound methods for the TSP. Sections 2, 3 and 4 discuss classes of

methods based on three different relaxations of the TSP: the assignment problem with the TSP cost function, the 1-tree problem with a Lagrangian objective function, and the assignment problem with a Lagrangian objective function. Section 5 briefly reviews some other relaxations of the TSP, while Section 6 discusses the performance of some state of the art computer codes. Besides material from the literature, the paper also includes the results and statistical analysis of some computational experiments designed for the purposes of this review. GRA

N83-31402*# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
A BAYESIAN APPROACH TO THE DESIGN OF DECISION RULES FOR FAILURE DETECTION AND IDENTIFICATION
Edward Y. Chow (Schlumberger-Doll Research) and Alan S. Willsky 14 Feb. 1983 41 p refs Submitted for publication
(Grant NGL-22-009-124; Contract N00014-77-C-0224)
(NASA-CR-172825; NAS 1.26:172825; AD-A126899; LIDS-P-1281) Avail: NTIS HC A03/MF A01 CSCL 12A

The formulation of the decision making process of a failure detection algorithm as a Bayes sequential decision problem provides a simple conceptualization of the decision rule design problem. As the optimal Bayes rule is not computable, a methodology that is based on the Bayesian approach and aimed at a reduced computational requirement is developed for disigning suboptimal rules. A numerical algorithm is constructed to facilitate the design and performance evaluation of these suboptimal rules. The result of applying this design methodology to an example shows that this approach is potentially a useful one. GRA

N83-31403# Illinois Univ., Urbana. Dept. of Computer Science.
ODE METHODS FOR THE SOLUTION OF DIFFERENTIAL-ALGEBRAIC SYSTEMS
C. W. Gear and I. R. Petzold Sep. 1982 57 p refs
(Contract DE-AC02-76ER-02383)
(DE83-010114; UIUCDCS-R-82-1103; COO-2383-0086; UILU-ENG-82-1727) Avail: NTIS HC A04/MF A01

The numerical solution of the differential/algebraic systems F(t, y, y') = 0. Many of these systems can be solved conveniently and economically using a range of ODE methods, and still others present insurmountable difficulty for all current ODE methods. A reduction technique which allows systems to be reduced to one that can be solved is described. A tool for the analytical study of the structure of systems is also discussed. DOE

N83-31404# Illinois Univ., Urbana. Elctromagnetics Lab.
MATHEMATICAL ISSUES IN INVERSE PROBLEMS, TASK 2 Final Report
Georges A. Deschamps Dec. 1982 23 p refs
(Contract W-7405-eng-48)
(DE83-012107; UCRL-15524) Avail: NTIS HC A02/MF A01

The main goal of this short research was to formulate problems rather than to solve them. The emphasis was to be on mathematical considerations. An important criterion in the choice of problems was to select those that promised practical solutions. The report is made up of several loose items. The abstract inverse problem is defined at a level of generality that makes it representative of a wide range of problems and lead to a formulation of related questions such as the importance of approximating the corresponding direct problem. Some probabilistic considerations are shown to account for noise in various elements of the system considered. The use of information theory concepts is suggested. Ill-posed problems and their regularization are defined and athe high frequency approximation is discussed. The effects of discretization as a regularization method are noted. A particular multilayer problem is presented and comments on the use of polarization are made. DOE

N83-31405# Sandia Labs., Albuquerque, N. Mex.
EFFICIENT EXTRAPOLATION METHODS FOR ODEs
Lawrence F. Shampine Feb. 1983 23 p refs
(Contract DE-AC04-76DP-00789)
(DE83-009390; SAND-83-0041) Avail: NTIS HC A02/MF A01

Gragg proposed a way of solving the initial value problem for a system of ordinary differential equations (ODEs) which is based on repeated extrapolation of the explicit midpoint rule. To advance the integration of y' = f(x, y) from an approximation y sub o to y(x sub o) to an approximation of y(x sub o + H), one must repeatedly select an integer n sub i and integrate from x sub o to x sub o + H using the midpoint rule and a step size h sub i = H/n sub i. If polynomial extrapolation is done, this process amounts to a convenient way of constructing explicit Runge-Kutta formulas of increasing order. The resulting code and its successors are so effective that extrapolation of the explicit midpoint rule is one of the most popular ways to solve the initial value problem for ODEs. Each of the Runge-Kutta formulas generated by the extrapolation process depends on the sequence (n sub i) selected. There are several criteria for selecting a sequence, such as the number of evaluations of f made (the number of stages of the Runge-Kutta formula), the absolute stability, and the efficiency of the resulting formula. The efficiency as it is affected by the choice of (n sub i) is considered. DOE

N83-31406# Knolls Atomic Power Lab., Schenectady, N. Y.
MATHEMATICAL FOUNDATIONS FOR NUMERICAL SOLUTION OF NAVIER-STOKES EQUATIONS
E. L. Wachspress Jul. 1982 61 p refs Presented at the Topical Conf. of the Math. and Computation Div. of the Am. Nucl. Soc., Salt Lake City, Mar. 1983
(Contract DE-AC12-76SN-00052)
(DE83-002539; KAPL-4152) Avail: NTIS HC A04/MF A01

Mathematical foundations for the TEACH/TURF numerical solution of the Navier-Stokes equation are explored. Properties of the discrete equations sufficient to guarantee convergence of the iterative procedure are described. It is proved that a problem dependent range of underrelaxation parameters exists for which the pressure velocity iteration of the linearized equations is convergent. Convergence of the iteration on the nonlinearity is not established. It is observed that turbulence modeling affects the nonlinear iteration and that existence of a stable time averaged solution to the turbulent flow equations must be examined. A crucial property required of the discrete equations for convergence is developed. DOE

N83-31407# Oxford Univ. (England). Engineering Lab.
AN ALGORITHM FOR PROFILE AND FRONT WIDTH REDUCTION IN FINITE ELEMENT ANALYSIS
S. W. Sloan 1983 67 p refs
(OUEL-1451/83; SM035/83) Avail: NTIS HC A04/MF A01

An algorithm which reduces the maximum frontwidth and profile of the stiffness matrix associated with a grid of finite elements is described. The algorithm can produce either an efficient nodal numbering strategy or an efficient element numbering strategy. When using the frontal method for meshes comprised of a single type of high-order element, it is necessary to consider the vertex nodes only in the renumbering algorithm. The resequencing process is fully automatic, fast, and is shown to produce efficient labelings for a number of typical finite element meshes. A complete implementation of the algorithm, written in standard FORTRAN 77, is given. Author (ESA)

N83-31408# Technische Hogeschool, Delft (Netherlands). Luchtwaart- en Ruimtevaarttechnike.
CHARACTERISTICS OF THE SECOND MUELLER PROFILE [ENIGE KARAKTERISTIEKE GROOTHEDEN VAN HET TWEEDE PROFIEL VAN MUELLER]
J. J. H. Blom Oct. 1982 38 p refs In DUTCH
(VTH-LR-359) Avail: NTIS HC A03/MF A01

The second Mueller airfoil profile was studied in order to facilitate the choice of an auxiliary profile in the transformation of an arbitrary profile into a circle following the Timman method. Expressions are deduced which allow nose radius of the profile to be determined. Calculation of profile coordinates with the Timman method is explained. The form of the second Mueller profile is compared with the first and with the von Karman-Trefftz

profile whose transformation function is much more complicated.
Author (ESA)

N83-31409# Sheffield Univ. (England). Dept. of Control Engineering.
STRUCTURE DETECTION AND MODEL VALIDITY TESTS IN THE IDENTIFICATION OF NONLINEAR SYSTEMS
S. A. Billings and W. S. F. Voon Oct. 1982 30 p refs
(Grant SRC-GR/B/31163)
(RR-196) Avail: NTIS HC A03/MF A01

A structure detection test which distinguishes between linear and nonlinear dynamic effects in the system response is derived. Model validity checks which indicate deficiencies in estimated nonlinear models are also presented. It is demonstrated that if it is possible to inject a non zero mean input which has a symmetric probability density function, a correlation test indicates prior to parameter estimation if it is worth fitting a nonlinear model to the data. Additional methods which detect all terms in the residuals which are predictable from all linear and nonlinear combinations of past inputs and outputs are developed. These techniques are simpler to compute and interpret than alternative methods.
Author (ESA)

N83-31410# Sheffield Univ. (England). Dept. of Control Engineering.
REALISATION THEORY AND THE INFINITE DIMENSIONAL ROOT LOCUS
S. P. Banks and F. Abbasi-Ghelmansarai Feb. 1983 31 p refs
(RR-210) Avail: NTIS HC A03/MF A01

The root locus of single input single output infinite dimensional systems which have a bounded realization are studied. The classical theory is generalized to the case of systems with bounded realizations whose transfer functions have a finite number of isolated algebraic singularities. A complete theory for such systems is developed in terms of generalized poles and zeros which must be regarded as the appropriate counterparts of the classical poles and zeros. It is shown that the latter behave in many ways as degenerate generalized singularities. Author (ESA)

N83-31411# Technische Hogeschool, Delft (Netherlands). Lab. of Electromagnetic Research.
FINITE-ELEMENT ANALYSIS OF TWO-DIMENSIONAL MAGNETIC FIELDS FROM STATIONARY ELECTRIC CURRENTS
Gerrit Mur Oct. 1982 25 p refs
(PB83-164871; Rept-1982-15) Avail: NTIS HC A02/MF A01 CSCL 09C

In the report a decription is given of the application of the finite-element method for computing (non)linear magnetic fields from stationary currents. A number of commercially available finite-element packages is discussed and the AFEP package is chosen as the package that is the most suitable one for our purposes. For the nonlinear case, a very efficient method for iteratively solving the nonlinear equations that are obtained using the finite-element method is described. For a number of configurations numerical results, that have been obtained using the AFEP package, are presented. Finally, a future development combining finite-elements and an integral equation is discussed.
Author (GRA)

N83-31412# Rice Univ., Houston, Tex. Dept. of Aeronautics and Mathematical Sciences.
COMPUTATIONAL METHODS FOR STATIC AND DYNAMIC SYSTEMS AND ENGINEERING APPLICATIONS Progress Report, 1 Sep. 1979 - 31 Aug. 1982
A. Miele 1982 31 p refs
(Grant NSF ENG-79-18667)
(PB83-176404; NSF/ECS-82007) Avail: NTIS HC A03/MF A01 CSCL 12A

Progress in research on analytical and numerical methods for optimal control problems is reported. Topics under study include: (1) supplementary optimality properties of gradient-restoration algorithms; (2) conjugate gradient-restoration algorithms for optimal control problems with nondifferential constraints and general boundary conditions; (3) Chebyshev problems of optimal control; (4) linear, two-point boundary-value problems; and (5) non-linear, two-point boundary value problems involving differential contraints, nondifferential constraints, and general boundary conditions. Research reports, journal articles, book contributions, master's and doctoral theses, and public presentations dealing with computational methods of interest for static and dynamic systems are listed. GRA

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N83-31413# Stanford Univ., Calif. Dept. of Statistics.
ESTIMATION IN NONCENTRAL DISTRIBUTIONS
Alan E. Gelfand 10 Jan. 1983 18 p refs
(Contract N00014-76-C-0475)
(AD-A125778; SU-TR-329) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper investigates alternatives to MVU (Minimum Variance Unbiased) estimators in noncentral chi-square and F distribution. Two directions are pursued. In the first, a general approach for uniformly improving on MVU estimators are characterized and illustrated as well. This effort extends earlier work of Perlman and Rasmussen and of Neff and Strawderman. Author (GRA)

N83-31414# Maryland Univ., College Park. Dept. of Management Sciences and Statistics.
SOME DISTRIBUTIONS ARISING FROM FAULTY INSPECTION WITH MULTITYPE DEFECTIVES, AND AN APPLICATION TO GRADING
Samuel Kotz and Norman L. Johnson (North Carolina Univ.) Apr. 1983 14 p refs
(Contract N00014-81-K-0301; Grant NSF MCS-80-21704)
(AD-A127381; UMD/DMSS-83/2) Avail: NTIS HC A02/MF A01 CSCL 12/1

Continuing their investigation of distributions arising from faulty and incomplete inspection from a finite population (Johnson, et al, 1980), Comm. in Stat. A9 917-922, Kotz and Johnson, ibid., All, (1997-2016) the authors investigate cases when inspection is not restricted to a single type of defect. Applications to grading problems, when grading is based on sets of defects found by sampling inspections, are discussed. GRA

N83-31415# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. Dept. of Applied Mathematics.
ON THE DISTRIBUTION OF THE LIKELIHOOD RATIO CRITERIA ASSOCIATED WITH K SAMPLES OF TWO CORRELATED RANDOM VARIABLES M.S. Thesis
Arthur J. Sherwood Mar. 1983 94 p refs
(AD-A127358; AFIT/GAM/MA/83M-1) Avail: NTIS HC A05/MF A01 CSCL 12/1

Likelihood ratio criteria and their sampling distributions are derived for $p = 2$ and equal sample sizes. From these distributions, tables of percentage points for the three likelihood ratio criteria are computed. A useful approximation is also obtained. The theoretical results are then applied to actual data. GRA

N83-31416# Idaho National Engineering Lab., Idaho Falls.
SEMISCALE UNCERTAINTY REPORT: METHODOLOGY
Ralph W. Golden Sep. 1982 56 p refs
(Contract DE-AC07-76ID-01570)
(DE83-000571; NUREG/CR-2459-Vol-1; EGG-2142-Vol-1) Avail: NTIS HC A04/MF A01

Definitions of statistical terms and methods used to derive uncertainty estimates for experimental measurements at the Semiscale Test Facility are presented in this report. Error propagation equations are developed to aid in determining uncertainties for complex calculations. Uncertainty estimates of the data system are presented, as well as the other types of errors, which are

analyzed in more detail in subsequent volumes that will cover each of the various types of measurements. DOE

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N83-31417# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. Dept. of Operations Research.
AVAILABILITY OF MAINTAINED SYSTEMS M.S. Thesis
Ahmed Aly ElShanawani Mar. 1983 113 p refs
(AD-A127365; AFIT/GOR/MA/82D-7) Avail: NTIS HC A06/MF A01 CSCL 05/1

Availability appears to be a more appropriate measure than reliability for measuring the effectiveness of maintained systems because it includes reliability as well as maintainability. This thesis is a survey and a systematic classification of the literature relevant to availability. Emphasis in this thesis is centered on a variety of topics related to availability. The topics discussed are: the definition and concepts of the availability, the probability density functions of failure times and of repair times, system configurations; and the various approaches employed to obtain the availability models; effect of preventive maintenance policies on availability; availability parameters in the model; and system optimization. Author (GRA)

N83-31418# Sheffield Univ. (England). Dept. of Control Engineering.
THE STABILITY OF ACCELERATING REPETITIVE SYSTEMS
J. B. Edwards Nov. 1982 20 p refs Submitted for publication (RR-204) Avail: NTIS HC A02/MF A01

The spatial stability of a sequence of accelerating repetitive operations is investigated using the output spectral density in a frequency band enclosing the first resonance-peak as a stability indicator. The operations of the sequence are identical in dynamic structure but subject to a constant rate of acceleration between operations thus resembling the rolling of metal strip and other repetitive manufacturing processes. The technique readily yields a value for the critical number of operations within which stability can be achieved, within the chosen frequency band. Simulation of a variety of systems confirms the physical usefulness of this number which correlates well with the observed number of operations necessary to achieve an output profile that is adequately stable from a practical viewpoint. Author (ESA)

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

No abstracts in this category.

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N83-31419# California Univ., Berkeley. Lawrence Berkeley Lab. Accelerator and Fusion Research Div.
SOURCE, ORIGIN, AND PROPAGATION OF QUENCHES MEASURED IN SUPERCONDUCTING DIPOLE MAGNETS
S. Caspi and W. V. Hassenzahl Nov. 1982 6 p refs Presented at the Appl. Superconductivity Conf., Knoxville, Tenn. 28 Nov. - 3 Dec 1982
(Contract DE-AC03-76SF-00098)
(DE83-007065; LBL-14390; CONF-821108-23) Avail: NTIS HC A02/MF A01

Transistions from the superconducting to normal state at 4.4 and 1.8 K in several model accelerator dipoles were recorded by a fast data-acquisitions system. The resistive voltage rise in the conductor during the transitions is used to determine accurately the location of the quench source in the magnets and to estimate the axial and turn-to-turn quench velocities. The quench velocity, temperature evolution and energy deposition in the coil were calculated using the program QUENCH, and are in reasnable agreement with the data. In the two dipole magnets studied, the transitions almost always occurred in the regions of highest field. In one coil the high field region is in the straight section because the field in this region is enhanced by iron support rings. In the other magnet the high field region is at the end, in the innermost turn of the first layer. Some quenches were preceded by large voltage spikes that can be ascribed to conductor motion. Other quenches do not appear to be associated with any large energy release. DOE

N83-31420# California Univ., Livermore. Lawrence Livermore Lab.
CONSIDERATION OF SOME FUNDAMENTAL EROSION PROCESSES ENCOUNTERED IN HYPERVELOCITY ELECTROMAGNETIC PROPULSION
Alfred C. Buckingham and Ronald S. Hawke 30 Sep. 1982 9 p refs Presented at the Tri-Service Symp. on Gun Tube Wear and Erosion, Dover, N.J., 25-28 Oct. 1982
(Contract W-7405-eng-48)
(DE83-000596; UCRL-87857; CONF-821043-2) Avail: NTIS HC A02/MF A01

Experimental and theoretical research was conducted jointly at the Livermore and Los Alamos National laboratories on dc electromagnetic railgun Lorentz accelerators. Pellets weighing a few grams to tens of grams were launched at velocities up to better than 11 km/s. The research is addressed to attaining repeated launches of samples at hypervelocity in target impact experiments. In these experiments, shock-induced pressure in the tens of megabars range are obtained for high pressure equations of state research. Primary energy sources of the order of several hundred kJ to a MJ and induction currents of the order of 1 or more MA are necessary for these launches. Erosion and deformation of the conductor rails and the accelerated sample material are continuing problems. The beating, stress, and erosion resulting from simultaneous imposition of rail induction current, dense plasma (armature) interaction, current distribution, magnetic field stresses and projectile/rail contact friction are examined. Author

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution*.

N83-31421# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio. Biodynamics and Bioengineering Div.
USAF (UNITED STATES AIR FORCE) BIOENVIRONMENTAL NOISE DATA HANDBOOK. VOLUME 2: INDEX
John N. Cole and Norma J. Peachey Mar. 1983 21 p refs 2 Vol.
(AF Proj. 7231)
(AD-A126851; AMRL-TR-75-50-Vol-2) Avail: NTIS HC A02/MF A01 CSCL 13/2

This report is an index which identifies the individual volumes published during the 1975-1982 period by the Air Force Aerospace Medical Research Laboratory (AFAMRL) as a multi-volume report, "USAF Bioenvironmental Noise Data Handbook", AMRL-TR-75-50 and lists those aircraft, ground equipment and other systems reported there in. GRA

N83-31422# Dayton Univ., Ohio. Research Inst.
COMPUTER PROGRAMS FOR PRODUCING SINGLE-EVENT AIRCRAFT NOISE DATA FOR SPECIFIC ENGINE POWER AND

METEOROLOGICAL CONDITIONS FOR USE WITH USAF (UNITED STATES AIR FORCE) COMMUNITY NOISE MODEL (NOISEMAP) Final Report
Henry T. Mohlman Wright-Patterson AFB, Ohio AMRL Apr. 1983 339 p refs
(Contract F33615-78-C-0500; AF Proj. 7231)
(AD-A127419; AFAMRL-TR-83-020; UDR-TR-82-30) Avail: NTIS HC A15/MF A01 CSCL 09/2

The Air Force community noise prediction model (NOISEMAP) is used to describe the aircraft noise exposure around airbases and thereby aid airbase planners to minimize exposure and prevent community encroachment which could limit mission effectiveness of the installation. This report documents two computer programs (OMEGA 10 and OMEGA 11) which were developed to prepare aircraft flight and ground runup noise data for input to NOISEMAP. OMEGA 10 is for flight operations and OMEGA 11 is for aircraft ground runups. All routines in each program are documented at a level useful to a programmer working with the code or a reader interested in a general overview of what happens within a specific subroutine. Both programs input normalized, reference aircraft noise data; i.e., data at a standard reference distance from the aircraft, for several fixed engine power settings, a reference airspeed and standard day meteorological conditions. Both programs operate on these normalized, reference data in accordance with user-defined, non-reference conditions to derive single-event noise data for 22 distances (200 to 25,000 feet) in a variety of physical and psycho-acoustic metrics. These outputs are in formats ready for input to NOISEMAP. Author (GRA)

N83-31423# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
LOCATION OF FOCAL POINTS OF FOCUS CW ULTRASONIC TRANSDUCERS
L. S. Beller Jun. 1982 30 p refs
(Contract DE-AC07-76ID-01570)
(DE83-009933; EGG-FM-5656) Avail: NTIS HC A03/MF A01

Because of diffractive effects the limited aperture of ultrasonic transducers, the effective focus of spherically curved element or lensed transducers lies in front of the geometric focus defined by the radius of curvature of the element or lens, and is a function of ultrasonic frequency. This focal point shift is quite significant in many practical cases, and can lead to serious degradation of system performance, if not accounted for. In this work, the focal point shift was calculated as a function of frequency and of transducer diameter. It is shown that the focal point shift can be described in terms of the ratio d/lambda and of the transducer, lambda is the wavelength, and F is the conventional ratio of geometric focal length to effective diameter of the transducer. A nomogram relating these quantities is developed and presented. DOE

N83-31424# Centro Informazioni Studi Esperienze, Milan (Italy). Documentation Service.
NEW ACOUSTIC TECHNIQUES FOR LEAK DETECTION IN FOSSIL FUEL PLANT COMPONENTS
G. Parini (Ente Nazionale per l'Energia Electricca, Milan) and G. Possa 1982 24 p refs Presented at EPRI Workshop in Incipient Failure Detection for Fossil Power Plant Components, Hartford, Conn., 25-27 Aug. 1982
(CISE-2005) Avail: NTIS HC A02/MF A01

Two on-line acoustic monitoring techniques for leak detection in feedwater preheaters and boilers of fossil fuel power plants are presented. The leak detection is based on the acoustic noise produced by the turbulent leak outflow. The primary sensors are piezoelectric pressure transducers, installed near the feedwater preheater inlets, in direct contact with the water, or mounted on boiler observation windows. The frequency band of the ausculta-tion ranges from a few kHz, to 10 to 15 kHz. The signals are characterized by their rms value, continuously recorded by means of potentiometric strip chart recorders. The leak occurrence is signalled by the signal rms overcoming predetermined threshold levels. Sensitivity, reliability, acceptance in plant control practice, and costs-benefits balance are satisfactory. Author (ESA)

N83-31425# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Theoretische Stroemungsmechanik.
PROPELLER NOISE AT SUBSONIC BLADE TIP SPEEDS, TORQUE AND THRUST FORCE
Roland Stuff Oct. 1982 95 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-821)
(DFVLR-Mitt-82-17; ESA-TT-821) Avail: NTIS HC A05/MF A01; DFVLR, Cologne DM 27,90

Sound generation due to propeller blade forces is described by an acceleration source. Closed form solutions are presented for the sound field of a propeller in yaw with asymmetric disk loading. The sound generation is assessed as a function of propeller blade forces (in dipole and quadrupole terms), of torque and thrust force by symmetrical and asymmetrical admission, as well as of forward speed. The three dimensional directional characteristics of an angular flux propeller are shown in an analytical formula. Author (ESA)

N83-30701# Rockwell International Corp., Downey, Calif.
SPACE SHUTTLE ORBITER ACOUSTIC FATIGUE CERTIFICATION TESTING
R. A. Stevens *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 81-99 refs (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 20/1

N83-30715# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Flight Dynamics Lab.
YC-15 EXTERNALLY BLOWN FLAP NOISE
Lyle G. Peck *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 3 May 1982 p 101-113 refs (For primary document see N83-30709 19-31)
Avail: NTIS HC A12/MF A01 CSCL 20/1

N83-30720*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
TEST PROGRAM TO DEVELOP VIBROACOUSTICS TEST CRITERIA FOR THE GALILEO BUS
D. L. Kern and C. D. Hayes *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 3 May 1982 p 229-247 (For primary document see N83-30709 19-31)
(Contract NAS7-100)
Avail: NTIS HC A12/MF A01 CSCL 20A

N83-30750# Naval Ocean Systems Center, San Diego, Calif.
VIBRATION AND ACOUSTIC RADIATION FROM POINT EXCITED SPHERICAL SHELLS
Edmond H. Wong and Sabih I. Hayek (Pennsylvania State Univ.) *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 5 May 1982 p 135-154 refs (For primary document see N83-30740 19-31)
Avail: NTIS HC A08/MF A01 CSCL 20/1

N83-30761# Naval Underwater Systems Center, New London, Conn.
TRANSIENT EFFECTS IN ACOUSTIC SOUND REDUCTION MEASUREMENTS
A. J. Kalinowski *In* Shock and Vibration Information Center The Shock and Vibration Bull., no. 50, part 2 Sep. 1980 p 29-44 refs 4 Vol. (For primary document see N83-30757 19-31)
Avail: NTIS HC A12/MF A01 CSCL 20/1

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N83-31426# Dartmouth Coll., Hanover, N.H. Dept. of Physics and Astronomy.
LARGE AMPLITUDE ION WAVES Final Report, Jun. 1977 - Jan. 1982

John E. Walsh 19 Nov. 1982 258 p
(Grant AF-AFOSR-3410-77; AF Proj. 2301)
(AD-A126990; AFOSR-83-0266TR) Avail: NTIS HC A12/MF A01 CSCL 20/7

Cerenkov Masers, which are mildly relativistic (100-200 KV), moderate-current, electron-beam (1-20A)-driven dielectric resonators, have been used to produce multihendred kW power levels in the middle part of the mm wavelength range. The devices make use of the fact that the evanescence scale length in the transverse direction of a slow wave is given by (lambda)(beta)(gamma) lambda - wavelength, beta velocity measured in units of the speed of light, gamma = 1/sg. root of(1-beta squared). The scaling (lambda)(beta)(gamma) approx. 1 will maintain good beam-to-wave-coupling in the mm range, while also maintaining convenient transverse resonator dimension. A variety of configurations and modifications are considered and discussed in detail. All experimental results presented pertain to oscillator configurations of the basic device. The basic interaction can, however, be used as the basis of an amplifier and a theoretical analysis of such a device is presented. GRA

N83-31427# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. Dept. of Nuclear Engineering.
NUMERICAL METHODS FOR THE PREPARATION OF POTENTIAL ENERGY CURVES OF DIATOMIC MOLECULES M.S. Thesis
Lyle L. Rutger Mar. 1983 248 p refs
(AD-A127315; AFIT/GNE/PH/83M-12) Avail: NTIS HC A11/MF A01 CSCL 20/10

This thesis presents the tools necessary to transform spectral data from diatomic molecules into potential energy curves which are most consistent with the experimental data and the quantum mechanical model (i.e., the Schroedinger wave equation (SWE) for a diatomic molecule). The first of these tools, a computer program called DUNCON, generates spectroscopic data. The program performs fits to separate groups of data and then merges the results in a manner based upon the relative errors and correlations of the separate data sets. The second tool is a computer program provided by C.R. Vidal which contains two major routines. The first routine generates potential energy curves using the Rydberg-Klein-Rees (RKR) method. The second routine through an inverted perturbation analysis (IPA) adjusts the RKR curve so it is consistent with the SWE model. Finally, techniques are presented for extending potential energy curves to the dissociation energy, De, when the spectroscopic data alone is inadequate for the purpose. GRA

N83-31428# Defence Research Establishment Valcartier (Quebec).
ESTIMATION OF THE CONCENTRATION OF A PHOTON-EMITTING GAS IN AN EXTENDED SOURCE
S. A. Barton Mar. 1983 45 p refs
(AD-A127162; DREV-4290/83) Avail: NTIS HC A03/MF A01 CSCL 12/1

Equations are derived, within the framework of geometrical optics, that relate the photon flux at a detector to the concentration of an emitting gas contained in an extended source of rectangular cross section, for two optical arrangements that have been used experimentally. Since the ratio of the experimental detector signals for the two quite dissimilar cases is in agreement with that predicted theoretically, the methods are validated. A method is described for maximizing the signal at the detector, using a given lens, which may be applied to an extended source of general cross section. Author (GRA)

N83-31429# New York Univ., New York. Dept. of Chemistry.
DIELECTRIC DISPERSION IN OPTICAL ELECTRON TRANSFER IN SOLUTION
Paul Delahay Mar. 1983 23 p refs Submitted for publication
Sponsored in part by NSF
(Contract N00014-82-K-0113; NR Proj. 359-258)
(AD-A126959; NYU/DC/TR-2-NEW-SERIES-2) Avail: NTIS HC A02/MF A01 CSCL 20/10

Dielectric dispersion causes the outer-sphere reorganization free energy to vary with photon energy in optical electron transfer. The resulting distortion of the spectral response for photoelectron emission may yield misleading evidence about the emission yield vs. photon energy relationship. Dispersion is taken into account in the calculation of emission threshold energies and the correlation between optical and thermal electron transfer. Results are given for V(2+), Cr(2+), Mn(2+), Fe(2+), Co(2+), Fe(CN)(4-6). Author (GRA)

N83-31430# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. Dept. of Physics.
ELECTRON SCATTERING FROM SILICON 30 M.S. Thesis - MIT
George Paul Bernhardt, IV Jan. 1983 63 p refs
(AD-A126946; AFIT-CI-NR-83-3T) Avail: NTIS HC A04/MF A01 CSCL 20/8

In 1940, the first experiments on electron excitation of nuclei to discrete levels were done by Collins and Waldman (1.1). The first theoretical discussions of this inelastic electron scattering were due to Mamasachlisor in 1943(1.2) and Snedden and Touschek in 1948(1.3). Lyman et al. in 1951, using a betatron, clearly saw effects due to deviations from point Coulomb scattering, thus allowing nuclear sizes to be measured using electron elastic scattering(1.4). Since that time, linear accelerators have become the standard source of high-energy electrons for such work. However, due to the limited resolution, an experiment of the type done in this thesis was not possible before the current generation of linear accelerators and spectrometers. The machine used in the 1950's allowed electron scattering with a resolution of delta p/p 3/5 x 10 and with currents of a few tenths of a microampere. Work done using these machines, although including some excellent work such as that done by Hofstadter(1.5) was limited to a few nuclei with well-isolated levels due to inability to resolve closely spaced levels. GRA

N83-31431# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
THE MOLECULAR WEIGHT DISTRIBUTION FOR MOLECULES REQUIRING ROTATIONAL DIFFUSION PRIOR TO REACTION
L. H. Peebles, Jr. Oct. 1982 18 p refs Submitted for publication
(Contract N00014-75-C-0542; NR Proj. 356-534)
(AD-A126908; TR-15) Avail: NTIS HC A02/MF A01 CSCL 20/8

In 1939 Flory announced the principle of equal reactivity of polymer chains. The principle maintains that the ability of a chain molecule to form larger molecules is independent of the chain length. The argument was very significant at that time for two reasons: First, the existence of high molecular polymers was considered by some to be improbable. These proponents argued that the high molecular weight species must have a higher diffusion constant, relative to the lower molecular weight species, which would eventually limit the extent of polymerization. Studies on condensation-type polymers with random coils demonstrated the general validity of the principle of equal reactivity. The second significant result was that the distribution of molecular weights could be readily calculated from kinetic parameters that were independent of chain length. GRA

N83-31432# California Univ., Berkeley. Lawrence Berkeley Lab. Engineering and Technical Services Div.
EBQ CODE: TRANSPORT OF SPACE-CHARGE BEAMS IN AXIALLY SYMMETRIC DEVICES
Arthur C. Paul Nov. 1982 305 p refs
(Contracts DE-AC03-76SF-00098; W-7405-eng-48; ONR-79-F-0004)
(DE83-011629; LBL-13241) Avail: NTIS HC A14/MF A01

Such general-purpose space charge codes as EGUN, BATES, WODF, and TRANSPORT do not gracefully accommodate the simulation of relativistic space-charged beams propagating a long distance in axially symmetric devices where a high degree of cancellation has occurred between the self-magnetic and self-

electric forces of the beam. The EBQ code was written specifically to follow high current beam particles where space charge is important in long distance flight in axially symmetric machines possessing external electric and magnetic field. EBQ simultaneously tracks all trajectories so as to allow procedures for charge deposition based on inter-ray separations. The orbits are treated in Cartesian geometry (position and momentum) with z as the independent variable. Poisson's equation is solved in cylindrical geometry on an orthogonal rectangular mesh. EBQ can also handle problems involving multiple ion species where the space charge from each must be included. Such problems arise in the design of ion sources where different charge and mass states are present. DOE

N83-31433# California Univ., Berkeley. Accelerator and Fusion Research Div.
ON STOCHASTIC COOLING OF BUNCHED BEAMS FROM FLUCTUATION AND KINETIC THEORY Thesis
Swapan Chattopadhyay Sep. 1982 298 p refs
(Contract DE-AC03-76SF-00098)
(DE83-012472; LBL-14826; BECON-33) Avail: NTIS HC A13/MF A01

A theoretical formalism for stochastic phase-space cooling of bunched beams in storage rings is developed on the dual basis of classical fluctuation theory and kinetic theory of many-body systems in phase-space. The physics is that of a collection of three dimensional oscillators coupled via retarded nonconservative interactions determined by an electron feedback loop. At the heart of the formulation is the existence of several disparate time-scales characterizing the cooling process. Both theoretical approaches describe the cooling process in the form of a Fokker-Planck transport equation in phase-space valid up to second order in the strength and first order in the auto-correlation of the cooling signal. With neglect of the collective correlations induced by the feedback loop, identical expressions are obtained in both cases for the coherent damping and Schottky noise diffusion coefficients. These are expressed in terms of Fourier coefficients in a harmonic decomposition in angle of the generalized nonconservative cooling force written in canonical action-angle variables of the particles in six-dimensional phase-space. Comparison of analytic results to a numerical simulation study with 90 pseudo-particles in a model cooling system is presented. DOE

N83-31434# Los Alamos Scientific Lab., N. Mex.
REMOTE HANDLING AND ACCELERATORS
Mahlon T. Wilson 1983 5 p refs Presented at the Particle Accelerator Conf., Santa Fe, N. Mex., 21-23 Mar. 1983
(Contract W-7405-eng-36)
(DE83-011161; LA-UR-83-1137; CONF-830311-112) Avail: NTIS HC A02/MF A01

The high-current levels of contemporary and proposed accelerator facilities induce radiation levels into components, requiring consideration be given to maintenance techniques that reduce personnel exposure. Typical components involved include beam-stops, targets, collimators, windows, and instrumentation that intercepts the direct beam. Also included are beam extraction, injection, splitting, and kicking regions, as well as purposeful spill areas where beam tails are trimmed and neutral particles are deposited. Scattered beam and secondary particles activate components all along a beamline such as vacuum pipes, magnets, and shielding. Maintenance techniques vary from hands-on to TV-viewed operation using state-of-the-art servomanipulators. Bottom- or side-entry casks are used with thimble-type target and diagnostic assemblies. Long-handled tools are operated from behind shadow shields. Swinging shield doors, unstacking block, and horizontally rolling shield roofs are all used to provide access. Common to all techniques is the need to make operations simple and to provide a means of seeing and reaching the area. DOE

N83-31435# Wisconsin Univ., Milwaukee. Dept. of Physics and Surface Studies.
INTERACTION OF LOW-ENERGY ELECTRONS WITH SURFACE LATTICE VIBRATIONS. FUTURE RESEARCH PLANS Progress Report
S. Y. Tong 1983 54 p refs
(Contract DE-AC02-79ER-10431)
(DE83-008079; DOE/ER-10431/T1) Avail: NTIS HC A04/MF A01

The theory of electron energy losses induced by scattering of vibrational quanta in the regime where the electron is deflected far off the specular direction was developed. Theoretical studies of the lattice dynamics of ordered overlayers of atoms on crystal surfaces have continued. Large angle energy loss data have allowed the study of the dispersion relation of a particular surface phonon on the Ni(100) surface, from the center of the two dimensional brillouin zone out to the zone boundary in the (110) direction. DOE

N83-31436# Argonne National Lab., Ill.
SHELL STRUCTURE AT HIGH SPIN AND THE INFLUENCE ON NUCLEAR SHAPES
T. L. Khoo, P. Chowdhury, I. Ahmad, J. Borggreen, H. Emling, D. Frekers, R. V. F. Janssens, A. Pakkanen, Y. H. Chung, P. J. Day et al 1982 19 p refs Presented at the INS Symp. on Dyn. of Nucl. Collective Motion, Mount Fuji, Japan, 6 Jul. 1982 Prepared in cooperation with Purdue Univ., Lafayette, Ind.
(Contract W-31-109-eng-38)
(DE83-008504; CONF-820738-6) Avail: NTIS HC A02/MF A01

Nuclear structure at high spin is influenced by a combination of liquid-drop and shell-structure effects. For $N < 86$ both contribute towards the occurrence along the yrast line of high spin oblate aligned particle configurations. Shell effects are mainly responsible for the prolate deformation of nuclei with $N > 90$. The competition between oblate and prolate driving effects leads to a prolate to oblate shape transition in Dy 154 sub 88. The role of rotation aligned configurations in the shape change is discussed. DOE

N83-31437# Tennessee Univ., Knoxville. Dept. of Physics.
ELECTRON AFFINITIES OF ATOMS, MOLECULES AND RADICALS
A. A. Christodoulides, D. L. McCorkle, and L. G. Christophorou 1982 300 p refs
(Contract DE-AS05-76EV-04703)
(DE83-008779; DOE/EV-04703/39) Avail: NTIS HC A13/MF A01

The theoretical, semiempirical and experimental methods employed to determine electron affinities (EAs) of atoms, molecules and radicals, and summarize the EA data obtained by these methods were reviewed. The detailed processes underlying the principles of the experimental methods are discussed very briefly. It is, nonetheless, instructive to recapitulate the definition of EA and those of the related quantities, namely, the vertical detachment energy, VDE, and the vertical attachment energy, VAE. The EA of an atom is defined as the difference in total energy between the ground state of the neutral atom (plus the electron at rest at infinity) and its negative ion. The EA of a molecule is defined as the difference in energy between the neutral molecule plus an electron at rest at infinity and the molecular negative ion when both, the neutral molecules and the negative ion, are in their ground electronic, vibrational and rotational states. DOE

N83-31438# Oak Ridge National Lab., Tenn. Atomic, Molecular and High Voltage Physics Group.
ELECTRON-ATTACHMENT PROCESSES
L. G. Christophorou, D. L. McCorkle, and A. A. Christodoulides 1982 229 p refs Prepared in cooperation with Tennessee Univ., Knoxville
(Contract DE-AS05-76EV-04703)
(DE83-008780; DOE/EV-04703/38; ORO-4703-38) Avail: NTIS HC A11/MF A01

Topics covered include: modes of production of negative ions, techniques for the study of electron attachment processes, dissociative electron attachment to ground state molecules, dissociative electron attachment to hot molecules (effects of temperature on dissociative electron attachment), molecular parent

negative ions, and negative ions formed by ion pair processes and by collisions of molecules with ground state and Rydberg atoms. DOE

N83-31439# Argonne National Lab., Ill.
VUV SPECTROSCOPY OF RARE GAS VAN DER WAALS DIMERS
P. M. Dehmer and S. T. Pratt 1982 68 p refs Presented at the NATO Advan. Study Inst. on Photophys. and Photochem. in the Vacuum Ultraviolet, Lake Geneva, Wis., 16-27 Aug. 1982 Submitted for publication
(Contract W-31-109-eng-38)
(DE83-007864; CONF-820853-4) Avail: NTIS HC A04/MF A01

The photoionization spectra of the homonuclear and heteronuclear rare gas dimers were studied in order to better understand the nature of the bonding in the Rydberg states and ions of these molecules were obtained. Results for Ar2, Kr2, Xe2, NeAr, NeKr, NeXe, ArKr, ArXe, and KrXe. Of the remaining dimer species (Ne2 and the He rare gas dimers), only Ne2 was studied using photoionization mass spectrometry. The results of the present series of experiments provide information both on the excited states of the neutral dimers and on the ground and excited states of the dimer ions. Using the data obtained in these measurements, a nearly complete list of ground state dissociation energies for the homonuclear and heteronuclear rare gas dimer ions was compiled. Somewhat less complete results are obtained for the excited states of these species. The observed trends in binding energy provide an excellent example of the systematic changes that occur as a result of changes in atomic orbital energies, polarizability, and internuclear distance, and these trends can be explained qualitatively in terms of simple molecular orbital theory. DOE

N83-31440# Argonne National Lab., Ill.
CROSS SECTIONS FOR INELASTIC SCATTERING OF ELECTRONS BY ATOMS. SELECTED TOPICS RELATED TO ELECTRON MICROSCOPY
Mitio Inokuti and Steven T. Manson (Georgia State Univ., Atlanta) 1982 74 p Presented at the Conf. on Electron Beam Interactions and Solids for Microscopy, Microanal. and Microlithography, Asilomar, Calif., 18 Apr. 1982
(Contract W-31-109-eng-38)
(DE83-007185; CONF-8204113-1) Avail: NTIS HC A04/MF A01

A resume of the Bethe theory, which provides a general framework for discussing the inelastic scattering of fast electrons and leads to powerful criteria for judging the reliability of cross-section data is presented. The central notion of the theory is the generalized oscillator strength as a function of both the energy transfer and the momentum transfer, and is the only non-trivial factor in the inelastic scattering cross section. Although the Bethe theory was initially conceived for free atoms, its basic ideas apply to solids, with suitable generalizations; in this respect, the notion of the dielectric response function is the most fundamental. Topics selected for discussion include the generalized oscillator strengths for the K shell and L shell ionization. As a function of the energy transfer, the generalized oscillator strength most often shows a non-monotonic structure near the K-shell and L-shell thresholds, which was interpreted as manifestations of electron-wave propagation through atomic fields. DOE

N83-31441# Argonne National Lab., Ill.
DISSOCIATION IN SMALL MOLECULES
P. M. Dehmer 1982 6 p refs Presented at the 1st Intern. Workshop on Desorption Induced by Electron. Transitions DIET-1, Williamsburg, Va., 12-14 May 1982
(DE83-007596; CONF-8205110-3) Avail: NTIS HC A02/MF A01

The study of molecular dissociation processes is one of the most interesting areas of modern spectroscopy owing to the challenges presented by even the simplest of diatomic molecules. The commonly used descriptions of molecular dissociation processes for diatomic molecules, the selection rules for predissociation, and a few of the principles to be remembered when one is forced to speculate about dissociation mechanisms in a new molecule are reviewed. Some of these points will be illustrated by the example of dissociative ionization in O2. DOE

N83-31442# Los Alamos Scientific Lab., N. Mex.
EARLY HISTORY OF PHYSICS WITH ACCELERATORS
Herbert L. Anderson 1982 61 p refs Presented at Intern. Colloq. on the Hist. of Particle Phys., Paris, 21-23 Jul. 1982 Submitted for publication
(Contract W-7405-eng-36)
(DE83-001982; LA-UR-82-3170; CONF-820757-1) Avail: NTIS HC A04/MF A01

The early history of physics at accelerators is reviewed, with emphasis on three experiments which have had a profound influence on our view of the structure of matter: The Franck and Hertz experiment opening practical ways of studying nuclear disintegration, and the discovery of the del (2+) isobar of the proton by Fermi and collaborators, revealing structure in the nucleon. Fermi's work is illustrated by pages from his notebook. DOE

N83-31443# California Univ., Berkeley. Lawrence Berkeley Lab.
EFFECT OF CAPACITIVE STORED ENERGY ON NEUTRAL-BEAM-ACCELERATOR PERFORMANCE
H. M. Owren, W. R. Baker, K. H. Berkner, D. B. Hopkins, and D. J. Massoletti Sep. 1982 6 p refs Presented at 12th Symp. on Fusion Technol., Juelich, West Germany, 13 Sep. 1982
(Contract DE-AC03-76SF-00098)
(DE83-002329; LBL-14317; CONF-820948-5) Avail: NTIS HC A02/MF A01

The results of tests to determine the effects of capacitive stored energy (1/2 square CV) on the performance of neutral-beam injectors are reported. Typical fault-current waveforms and methods to limit fault current are presented. Tests indicate that deterioration of performance is not only a function of peak stored energy but is also dependent on peak current and the characteristics of the breakdown. DOE

N83-31444# California Univ., Berkeley. Lawrence Berkeley Lab.
CALCULATIONS OF GAS DENSITY IN A CLOSELY-PACKED MULTI-CHANNEL ELECTROSTATIC QUADRUPOLE (MESQ) ARRAY
C. F. Burrell and D. A. Goldberg Sep. 1982 9 p refs Presented at 29th Natl. Symp. on Am. Vacuum Soc., Baltimore, 16 Nov. 1982
(Contract DE-AC03-76SF-00098)
(DE83-002233; LBL-14631; CONF-821111-12) Avail: NTIS HC A02/MF A01

The pumping properties of a multi-channel electrostatic quadrupoles (MESQ) array such as interposed between the ion source/pre-accelerator and a MESQ accelerator for development for high energy negative ion neutral beamlines were studied. A two and a half dimensional Monte Carlo code under the assumption of molecular flow, with pumping to be provided by cryopanels on either side of the array was used. The basic unit treated by the code was a unit cell which was translated laterally or longitudinally to reproduce the full array. The behavior of the system as a function of electrode geometry, array size, and cryopanel position was studied. It was found necessary to insert lateral baffles periodically to prevent downstream migration of the gas in the region between the outer edge of the MESQ array and the cryopanels. Author

N83-31445# Oak Ridge National Lab., Tenn.
AVAILABILITY OF ENRICHED ISOTOPIC MATERIAL FOR ACCELERATOR TARGETS
E. Newman 1982 8 p refs Presented at 7th Conf. on the Appl. of Accelerators in Res. and Ind., Denton, Tex., 8 Nov. 1982
(Contract W-7405-eng-26)
(DE83-003445; CONF-8211233) Avail: NTIS HC A02/MF A01

The electromagnetic isotope enrichment facility at ORNL provides a broad spectrum of highly enriched stable isotopes to the worldwide scientific community. The continued timely availability of these materials is of vital importance in many areas of basic

research and, in particular, as source material for the fabrication of accelerator targets. A brief description of the facility and its capabilities and limitations is presented. DOE

N83-31446# Los Alamos Scientific Lab., N. Mex.
FUTURE PROSPECTS IN N-NUCLEAR INTERACTIONS
J. M. Moss 1982 11 p refs Presented at the Cyclotron Facility Workshop, Bloomington, Ind., 28-30 Oct. 1982
(Contract W-7405-eng-36)
(DE83-003549; LA-UR-82-3466; CONF-831050-2) Avail: NTIS HC A02/MF A01

Polarization observables and antiproton-nucleus reactions, which have near term future impact on our understanding of the interaction of medium-energy nucleons in nuclei were examined. More speculative future experiments employing cooled beams, double spectrometer systems, and large Q-value low momentum transfer reactions are also discussed. DOE

N83-31447# Mound Lab., Miamisburg, Ohio.
SOLID-STATE PROTON NUCLEAR MAGNETIC RESONANCE STUDIES OF HYDROGEN SITE OCCUPANCIES, ELECTRONIC STRUCTURE PROPERTIES, AND DIFFUSION BEHAVIOR IN TRANSITION-METAL HYDRIDES Ph.D. Thesis - California Inst. of Tech.
Robert Clark Bowman, Jr. 30 Aug. 1982 229 p refs
(Contract DE-AC04-76DP-00053)
(DE83-002822; MLM-2999) Avail: NTIS HC A11/MF A01

Solid state NMR techniques were used to measure the proton lineshapes, Knight shifts, and relaxation times in several transition hydrides. The roles of host metal structures and substitutional alloying on the hydrogen site occupancy, the electronic structure properties, and diffusion mechanisms were studied. An improved method for observing the rigid lattice proton lineshapes and extracting the second moments was developed. Comparisons of the experimental second moments for polycrystalline samples with the values calculated from Van Vleck formulas for nuclear dipolar interactions have indicated that only tetrahedral interstitial sites are occupied by the protons in TiH/sub x/, ZrH/sub x/, crystalline TiCuHo.94, Ti2CuH1.9, and Zr2PdH/sub x/ (with x < 2) while both tetrahedral and octahedral sites can be occupied in amorphous a-TiCuH1.4, Ti2CuH2.6, and Zr2PdH/sub x/ (x > 2). DOE

N83-31448# Oak Ridge National Lab., Tenn.
RECENT DEVELOPMENTS IN PHOTOELECTRON DYNAMICS USING SYNCHROTRON RADIATION
T. A. Carlson, M. O. Krause, J. W. Taylor (Wisconsin Univ., Madison), P. R. Keller (Wisconsin Univ., Madison), M. N. Piancasteli (Wisconsin Univ., Madison), F. A. Grimm (Tennessee Univ., Knoxville), and T. A. Whitley (Tennessee Univ., Knoxville) 1982 5 p refs Presented at the 7th Conf. on the Appl. of Accelerators in Res. and Ind., Denton, Texas, 8 Nov. 1982 Sponsored in part by the Wisconsin Alumni Research Foundation
(Contract W-7405-eng-26; Grants NSF DMR-79-24555; NSF CHE-81-21205; NSF DMR-77-21888)
(DE83-003451; CONF-821123-21) Avail: NTIS HC A02/MF A01

Through a collaborative effort of members of the Oak Ridge National Laboratory and Universities of Wisconsin and Tennessee, a comprehensive study of atoms and molecules using angle-resolved photoelectron spectroscopy and synchrotron radiation is underway at the Synchrotron Radiation Center, Stoughton, Wisconsin. Over 50 molecules and atoms have been investigated. These results, coupled with theory, aim at a better understanding of the dynamics of photoionization and of the wave functions that control these processes. In particular, attention is given to the following topics: metal atomic vapors, generalization of molecular orbital types, autoionization, shape resonances, core shell effects, satellite structure, and the Cooper minimum. DOE

N83-31449# Connecticut Univ., Storrs. Dept. of Physics.
THE 2-PHOTON EXCITATION PROCESSES TO NEAR-ULTRAVIOLET STATES IN Ce-3 PLUS:CaF2 Progress Report, 1 Apr. 1982 - 31 Mar. 1983
D. S. Hamilton Nov. 1982 24 p refs
(Contract DE-AC02-82ER-12012)
(DE83-003293; DOE/ER-12012/1) Avail: NTIS HC A02/MF A01

The two photon transition to the lowest Ce(3+)5d state in Ce(3+):CaF2 was investigated. At liquid helium temperatures, a no phonon resonance line is observed and is accompanied by a vibrational sideband. The peak cross section for this transition is of order 10 to the negative 53rd power cm(4)s indicating strong parity mixing for the 5d levels. The no phonon line shows a polarization anisotropy consistent with a tetragonal Ce(3+) site of C4/sub V/ symmetry. The phonon side band shows a different anisotropy than the no phonon line and its polarization characteristics are a function of phonon frequency and temperature. DOE

N83-31450# California Univ., Berkeley. Lawrence Berkeley Lab.
CROSSED-MOLECULAR-BEAMS SCATTERING OF OXYGEN ATOMS Ph.D. Thesis
Robert J. Baseman Nov. 1982 249 p refs
(Contract DE-AC03-76SF-00098)
(DE83-004296; LBL-15259) Avail: NTIS HC A11/MF A01

The reactions of O(3P) with six prototypical unsaturated hydrocarbons, and the reaction O(1D) with HD, have been studied in high-resolution crossed-molecular-beams scattering experiments with mass-spectrometric detection. The observed laboratory-product angular and velocity distributions unambiguously identify parent-daughter ion pairs, distinguish different neutral sources of the same ion, and have been used to identify the primary products of the reactions. The derived center-of-mass product angular and translational energy distributions have been used to elucidate the detailed reaction dynamics. These results demonstrate that O(3P)-unsaturated hydrocarbon chemistry is dominated by single bond cleavages, leading to radical products exclusively. DOE

N83-31451# Brookhaven National Lab., Upton, N. Y.
WEAK-NEUTRAL-CURRENT ELASTIC SCATTERING OF NEUTRINOS
R. E. Lanou 1982 12 p Presented at the Intern. Conf. on Neutrino Phy., Balaton, Hungary, 13-19 Jun. 1982 Prepared in cooperation with Brown Univ., Providence, R.I., National Lab. for High Energy Physics, Oho, Ibaraki, Japan, Osaka Univ., Japan, Pennsylvania Univ., Philadelphia, State Univ. of N.Y., Stony Brook, and Tokyo Univ., Tanashi, Japan
(Contract DE-AC02-76CH-00016)
(DE83-002327; BNL-31950; CONF-820675-5) Avail: NTIS HC A02/MF A01

Neutral current phenomena was measured at low neutrino energy (200 < or equal to E sub nu) < or equal to 3 GeV). The principal goals center upon the elastic reactions: anti nu (sub mu) + p yields anti nu (sub mu) + p, and anti nu (sub mu) + e yields anti nu (sub mu) + e. DOE

N83-31452# Fermi National Accelerator Lab., Batavia, Ill.
PION-PROTON BACKWARD ELASTIC SCATTERING BETWEEN 30 AND 90 GeV/c
W. F. Baker, D. P. Early, R. M. Kalbach, J. S. Klinger, A. J. Lennox, P. A. Polakos, A. E. Pifer, and R. Rubinstein Nov. 1982 38 p refs Prepared in cooperation with Arizona Univ., Tucson Submitted for publication
(Contract DE-AC02-76CH-03000)
(DE83-000683; FERMILAB-Pub-82/78-EXP) Avail: NTIS HC A03/MF A01

Backward elastic scattering of pi + or - on protons has been measured for incident pion momenta between 30 and 90 GeV/c and 0 < -u < 0.5 (GeV/c) squared. The u-dependence of the cross sections is similar to that observed at lower momenta, and Regge models give acceptable fits to the data. DOE

N83-31453# Science Research Council, Chilton (England).
WHAT WE CAN LEARN FROM THE NEXT GENERATION OF EXPERIMENTS
G. G. Ross (Oxford Univ., England) May 1982 39 p refs Presented at Internatl. School of Subnucl. Phys. The 19th Course: The Unity of the Fundamental Interaction, Erice, Sicily, 1981
(PB83-164780; RL-81-095) Avail: NTIS HC A03/MF A01 CSCL

21H

The predictions of the standard SU(3) x SU(2) x U(1) model (the(3,2,1) model) and the crucial tests of the theory are discussed. Particular emphasis is placed on those predictions (such as those for intermediate vector bosons) which might be proved or discussed in the next few years. Alternatives to the standard model are discussed where they make new or different predictions. Evidence for these might come from the discovery of processes forbidden by the standard theory and non-accelerator experiments might be the best way to learn about such processes. The Grand Unified Theory is discussed with reference to the alternatives or modifications necessary to avoid the hierarchy problem. This leads to a consideration of supersymmetric, technicolor and constituent models, their predictions and the experimental searches for them. GRA

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N83-31454# Junta de Energia Nuclear, Madrid (Spain). Dept. de Materiales y Metalurgia.

NEUTRON FLUX DEPRESSION IN THE UO2-Pu2 (15 TO .30%) FUEL RODS FROM IVO-FR2-Vg7-IRRADIATION EXPERIMENT

J. LopezJiminez and J. L. FernandezMarron 1983 59 p refs In SPANISH; ENGLISH summary

(JEN-538; ISSN-0081-3397; ISBN-84-500-8669-8) Avail: NTIS HC A04/MF A01

The thermal-neutron flux depression within a fuel rod has a great influence in the radial temperature profile of the rod, especially for high enrichment fuel. The UO2-PuO2 (15 to 30% PuO2) fuel pins for the KfK-JEN joint irradiation program IVO were studied in the FR2 reactor. Different methods: (diffusion, Bonalumi, successive generations) were compared and a parabolic approximation approach was developed. Author

N83-31455# Teledyne Energy Systems, Timonium, Md.

SPECIFICATION FOR STRONTIUM-90 500-WATT(e) RADIOISOTOPIC THERMOELECTRIC GENERATOR Final Report

T. Hammel, J. Himes, A. Lieberman, John W. McGrew, D. Owings, and F. Schumann Apr. 1983 96 p refs

(Contract DE-AC04-83AL-22028)

(DE83-011200; DOE/AL-22028/T2; TES-3170) Avail: NTIS HC A05/MF A01

A conceptual design for a demonstration 500-watt(e) radioisotopic thermoelectric generator (RTG) was created. The design effort was divided into two tasks, viz., create a design specification for a capsule strenth member that utilizes a standard Strontium 90 fluoride filled WESF inner liner, and create a conceptual design for a 500-watt(e) RTG. The strength member specification was designed to survive an external pressure of 24,500 psi and meet the requirements of special form radioisotope heat sources. Therefore the capsule is if desired, licensed for domestic and international transport. The design for the RTG features a radioisotopic heat source, an array of nine capsules in a tungsten biological shield, four current technology series connected thermoelectric conversion modules, low conductivity thermal insulation, and a passive finned housing radiator for waste heat dissipation. The preliminary RTG specification formulated previous to contract award was met or exceeded. DOE

N83-31456# Illinois Univ., Urbana. Dept. of Physics.

HIGH-ENERGY PHOTOPRODUCTION OF RHO AND PHI VECTOR MESONS Ph.D. Thesis

Paul Hayward Callahan 1983 216 p refs

(Contract DE-AC02-76ER-01195)

(DE83-007418; DOE/ER-01195/474; COO-1195-474) Avail: NTIS HC A10/MF A01

The photoproduction of rho and phi vector mesons from hydrogen in the broad band neutral beam were studied. Forward going two particle final states were detected in a multiparticle spectrometer consisting of two analyzing magnets, a multiwire proportional chamber tracking system and a particle identification system. Recoil protons and target fragments were observed in a recoil detector which surrounded the target. The total elastic cross sections were measured to be independent of energy at the 10% level from 35 to 225 GeV at 10.6 microbe for the rho and from 35 to 165 GeV at 0.64 microbe for the phi. The elastic differential cross sections were also measured. Approximately 20% of the diffractive rho and phi events were found to be inelastic from an analysis of the recoil detector. The t dependence of the fraction of diffractive events which are inelastic for both the phi and the psi are consistent with a universal function determined from the rho data. DOE

N83-31457# Golder Associates, Inc., Lakewood, Colo.

IN-SITU TEST PROGRAMS RELATED TO DESIGN AND CONSTRUCTION OF HIGH-LEVEL NUCLEAR WASTE (HLW) DEEP GEOLOGIC REPOSITORIES, TASK 2. APPENDICES Final Report

W. Roberds, F. Bauhof, L. Gonano, E. Wildanger, W. Dershowitz, F. Marinerlli, K. Jones, C. Weldon, B. Nebbitt, and M. Stewart Mar. 1983 694 p

(DE83-901895; NUREG/CR-3065-813-1163-Vol-2) Avail: NTIS HC A99/MF A01; SOD HC $13.00

The media and sites considered include: (1) basalt at Hanford, Washington; (2) tuff at Yucca Mountain, Nevada Test Site; (3) domal salt at specific Gulf Coast sites; (4) bedded salt at an unspecified site; and (5) granite at an unspecified site. A licensing perspective is outlined and a defensible rationale developed and utilized for the test selection process. This rationale essentially consists of: establishing the information needs for construction authorization; assessing the relevant capabilities of available tests; and matching the capabilities of specific tests to the perceived information needs. The information needs at any time consist of the additional information (if any) needed in order to predict satisfactory repository system performance with the required level of confidence, and thus are a function of: the significance of the repository engineered components and site characteristics to system performance; the currently available information, which may be supplemented with time; and the acceptable level of confidence in satisfactory performance for each licensing step. DOE

N83-31458# California Univ., Livermore. Lawrence Livermore Lab.

LASER ISOTOPE SEPARATION IN NUCLEAR-WASTE BY-PRODUCT UTILIZATION

James W. Dubrin Feb. 1983 7 p Presented at the Nucl. Waste Management Symp., Tuscon, Ariz., 27 Feb. - 3 Mar. 1983

(Contract W-7405-eng-48)

(DE83-009243; UCRL-88167; CONF-830205-22) Avail: NTIS HC A02/MF A01

Various by-products in spent nuclear fuels including strategic metals are uniquely useful and of high intrinsic value. Isotope separation is necessary to achieve the full benefits of fission product partitioning, increasing the specific activity of radioactive modifications or reducing the intrinsic radiation associated with various elements. The atomic vapor laser isotope separation process, under large scale development of uranium enrichment, applies to most of the spent fuel nuclides and offers attractive benefit to costs. DOE

N83-31459# Argonne National Lab., Ill.

ENVIRONMENTAL MONITORING CONSIDERATIONS FOR LOW-LEVEL WASTE DISPOSAL SITES

Jacob Sedlet 1982 20 p refs Presented at the Symp. on Low Level Waste Disposal, Washington, 29 Sep. 1982

(Contract W-31-109-eng-38)

(DE83-008534; CONF-820911-4) Avail: NTIS HC A02/MF A01

All waste disposal sites are required to monitor the environment. The proposed NRC licensing rule, 10 CFR Part 61, requires that

such monitoring be conducted before, during, and after a site is operated. An adequate monitoring program consists of measuring concentrations of radionuclides, chemically-toxic substances, and leachate indicators in environmental media and of evaluating specific physical properties of the site. In addition, the composition of the buried waste must be known. Methods for obtaining this information are discussed and monitoring programs are presented for the preoperational, operational, and postclosure phases of a disposal site. DOE

N83-31460# California Univ., Berkeley. Lawrence Berkeley Lab.
DATABASE FOR NUCLEAR-WASTE DISPOSAL FOR TEMPERATURES UP TO 300 DEG C
S. L. Phillips and L. F. Silvester Sep. 1982 21 p refs Presented at 8th European Conf. on Thermophys. Properties: High Temperatures High Pressure, Baden-Baden, West Germany, 27 Sep. 1982
(DE83-003278; LBL-14722; CONF-820985-1) Avail: NTIS HC A02/MF A01

A computerized database is compiled of evaluated thermodynamic data for aqueous species associated with nuclear waste storage. The data are organized as hydrolysis and formation constants; solubilities of oxides and hydroxides; and, as Nernstian potentials. More emphasis is on stability constants. Coefficients are given to calculate stability constants at various ionic strengths and to high temperatures. Results are presented as tables for selected species including uranium, amorphous silica and actinides. DOE

74 OPTICS

Includes light phenomena.

N83-31461*# National Aeronautics and Space Administration, Washington, D. C.
EXPERIMENTS WITH OPTICAL INSTRUMENTS
V. Savinykh May 1983 8 p Transl. into ENGLISH from Aviat. Kosmonavt. (USSR), no. 1, Jan. 1983 p 42-43 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77225; NAS 1.15:77225) Avail: NTIS HC A02/MF A01 CSCL 20F

Photography was used to document known defects of the periscopic instrument used to check spacecrews in the descent module of the Soyuz T-4. The screen of the altitude control unit was also photographed and revealed glare in the central field of vision. A light filter was installed in the peripheral window to observe the Sun and horizon of the Earth. Checking attitude control by means of polaroids enabled a 5 further advance (500 km) into the zone of shadow. The attitude control unit was used to check the orbital orientation with respect to the vertical during the night segment of flight. A lens screen was used for the emission glow of the atmosphere at an altitude of about 100 km. Docking of the Soyuz T-4 was observed by means of an onboard display, a television camera, and a sighting device. From a distance of about 5 km, the space station could be seen as a bright dot in the sighting device. Docking occurred in shadow. A.R.H.

N83-31462# Systems and Applied Sciences Corp., Riverdale, Md.
FINAL TACTICAL DECISION AID (FTDA) FOR INFRARED (8-12 MICROMETERS) SYSTEMS-MANUAL VERSION. VOLUME 2, APPENDIX A: ATMOSPHERIC TRANSMISSION TABLES
Donald B. Hodges, Scott D. Hamilton, Robbie E. Hood, and Ronald F. Wachtmann Hanscom AFB, Mass. AFGL 15 Sep. 1982 28 p 5 Vol.
(Contract F19628-81-C-0042; AF Proj. 2688)
(AD-A127355; AFGL-TR-82-0294-Vol-2; SR-3-Vol-2) Avail: NTIS HC A03/MF A01 CSCL 17/5

The tables required to calculate 8-12 micron atmospheric transmission at 4 km range for use in determining maximum lock-on range (MLOR) and maximum acquisition range (AR) from the Manual Version of the FTDA are presented. GRA

N83-31463# Maryland Univ., College Park. Dept. of Physics and Astronomy.
STUDY OF CCD EYEPIECE ON T-4 THEODOLITE Final Report, Jul. 1977 - Nov. 1982
Douglas G. Currie Nov. 1982 146 p
(Contract F19628-77-C-0186; AF Proj. 3201)
(AD-A127322; AFGL-TR-82-0184) Avail: NTIS HC A07/MF A01 CSCL 17/8

This document describes the effort of the University of Maryland to develop a Charge Coupled Device (CCD) Camera System, with the necessary support hardware and analysis software, to act as an impersonal electronic eyepiece on the T-4 theodolite for astronomical longitude and latitude determinations. This report will describe the concept, the implementation, and the current status of this project. Analysis of the field test data shows that the developed system has a performance level significantly higher than the original design goals, as well as being far above the best human skill level. The system is now being operated by personnel of the Geodetic Survey Squadron. The results of the overall operation will be addressed with respect to the current performance and future potential of this system. GRA

N83-31464# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. Dept. of Space Operations.
MODELING OF DIFFUSE PHOTOMETRIC SIGNATURES OF SATELLITES FOR SPACE OBJECT IDENTIFICATION M.S. Thesis
John D. Rask Dec. 1982 225 p refs
(AD-A127415; AFIT/GSO/PH/82D-3) Avail: NTIS HC A10/MF A01 CSCL 22/3

The diffuse reflective characteristics of four types of low earth orbit satellites were mathematically modeled using phase functions for ideal Lambertian surfaces. A FORTRAN computer program was developed to generate simulated signatures and compare them point by point to real signatures to obtain a sum of the squares of the residuals (SSR), in order to perform pattern recognition and satellite identification. One set of signatures was used to validate the computer model of one satellite type, and the others were used to test the program's ability to identify the satellite. The tested model involved line-of-sight obcuration of some parts by others, relative motion of body parts, and for phase shadowing. The program was able to correctly identify the modeled satellite, as long as the phase angle remained small, generally less than ninety degrees. For larger phase angles, the true signatures diverged significantly from simulated signatures. In every case, the signatures predicted using the Lambertian assumption were dimmer than the measured signatures at larger phase angles. GRA

N83-31465# Harry Diamond Labs., Adelphi, Md.
THE ACOUSTO-PHOTOREFRACTIVE EFFECT IN LiNbO3
Philip S. Brody, Nick Karayianis, and Emanuel Katzen Mar. 1983 27 p refs
(DA Proj. 1L1-61101-A-91A)
(AD-A127382; HDL-TM-83-1) Avail: NTIS HC A03/MF A01 CSCL 20/6

The acousto-photorefractive memory storage effect in lithium niobate crystal and its application to a memory correlator device were studied in a series of experiments. The effect is a semipermanent index of refraction variation in a LiNbO3 surface acoustic wave (SAW) substrate delay line produced by the interaction of a short, intense pulse of laser illumination and a SAW traveling down the length of the line. The experiments show that the storage is the result of an optical photorefractive effect and not, at least predominantly, a result of a direct interaction between an electric field associated with the acoustic wave and charge carriers. GRA

N83-31466# California Univ., Berkeley. Lawrence Berkeley Lab.
ADVANCED OPTICAL AND THERMAL TECHNOLOGIES FOR APERTURE CONTROL

S. E. Selkowitz, C. M. Lampert, and M. Rubin Sep. 1982 10 p refs Presented at Passive and Hybrid Solar Energy Update Conf., Washington, D.C., 15 Sep. 1982
(Contract DE-AC03-76SF-00098)
(DE83-003663; LBL-15131; CONF-820940-8) Avail: NTIS HC A02/MF A01

Control of heat transfer and radiant energy flow through building apertures is essential for maximizing thermal and daylighting benefits and minimizing undesired heating and cooling loads. Architectural solutions based on current technology generally add devices such as louvers, shutters, shades, or blinds to the glazing system. The objectives and initial accomplishments of a research program the goal of which is to identify and evaluate advanced optical and thermal technologies for controlling aperture energy flows, thus reducing building energy requirements are outlined. Activities are described in four program areas: (1) low-conductance, high-transmittance glazing materials (e.g., heat mirrors, aerogels); (2) optical switching materials (e.g., electrochromic, photochromic); (3) selective transmitters; and (4) daylight enhancement techniques. DOE

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N83-31467 Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
THE CRITICAL IONIZATION VELOCITY: A BIBLIOGRAPHY
I. Axnaes, N. Brenning, and M. A. Raadu Dec. 1982 29 p Sponsored by Swedish Natural Science Research Council
(TRITA-EPP-82-13; ISSN-0348-7539) Avail: Issuing Activity

A collection of about 120 references is presented. The papers are labelled theory or experiment, and space, impact, discharge or general. Author (ESA)

N83-31468# Junta de Energia Nuclear, Madrid (Spain). Dept. de Investigacion Basica.
GALADRIEL: A MODULAR SYSTEM OF CODES FOR DISCHARGE DATA STORAGE USED AT TOKAMAK TJ-1
J. Guasp 1983 98 p refs In SPANISH; ENGLISH summary
(JEN-535; ISSN-0081-3397; ISBN-84-500-8574-x) Avail: NTIS HC A05/MF A01

The GALADRIEL code system is able to sample the discharge data at a 83 KHz rate using a LPA-11K controller and AD-11K converters and store it on structured files. The file details are transparent to the retrieval and plotting programs. Graphs are available on both Tektronix 4010-1 display and Versatec 1200 plotter. The system allows data storing and retrieval on PDP-11/34 and UNIVAC-1100/8 computers as well as on magnetic tape. Author

N83-31469# Junta de Energia Nuclear, Madrid (Spain). Div. de Investigacion Basica.
A SYNCHRONIZATION SYSTEM TO DIGITALIZE TJ-1 TOKAMAK DATA
L. Pacios, J. Guasp, and A. Perez-Navarro 1983 28 p refs In SPANISH; ENGLISH summary
(JEN-539; ISSN-0081-3397; ISBN-84-500-8670-1) Avail: NTIS HC A03/MF A01

At the TJ-1 Tokamak, signals are stored on a 60-channel magnetic memory. A system to address those channels and synchronize readout is presented. The Digitalized signals are stored in structured files on PDP-11/34 magnetic disks. Author

N83-31470# Materials Research Labs., Melbourne (Australia).
THE PARA: A COMPUTER SIMULATION CODE FOR PLASMA DRIVEN ELECTROMAGNETIC LAUNCHERS
Y.-C. Thio Mar. 1983 29 p refs
(MGL-R-873; AR-003-283) Avail: NTIS HC A03/MF A01

A computer code for simulation of rail type accelerators utilizing a plasma armature was developed and is described in detail. Some time varying properties of the plasma are taken into account in this code thus allowing the development of a dynamical model of the behaviour of plasma in a rail type electromagnetic Launcher. The code is being successfully used to predict and analyze experiments on small calibre rail gun launchers. Author

N83-31471# Nagoya Univ. (Japan). Inst. of Plasma Physics.
DISSIPATIVE EFFECTS ON STABLE RFP CONFIGURATION
N. Nakajima, Y. Nomura, and H. Momota Apr. 1983 34 p refs
(IPPJ-631) Avail: NTIS HC A03/MF A01

Evolutions of reversed field pinch (RFP) equilibria due to dissipative effects are studied theoretically. It is shown that the existence of stable RFP equilibria satisfying ideal and nonideal MHD stability criteria requires adequate hollow temperature profiles. If no profile control is applied to these RFP equilibria, the sufficient condition of stability for $m = 1$ modes is first violated due to the disappearance of the toroidal current reversal near the surface within a short time. M.G.

N83-31472# Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
OBSERVATION OF ION-ACOUSTIC RAREFACTION SOLITONS IN A MULTICOMPONENT PLASMA WITH NEGATIVE IONS
Gerson Otto Ludwig, J. L. Ferreira, and Y. Nakamura (Inst. of Space and Astronautical Science, Tokyo, Japan) Jul. 1983 17 p refs Presented at 35th Ann. Meeting Submitted for publication
(INPE-2804-PRE/364) Avail: NTIS HC A02/MF A01

The propagation of ion-acoustic solitons in a plasma with negative ions was observed experimentally. For sufficiently large concentration of negative ions, an initial rarefactive (negative) voltage pulse breaks up into solitons, whereas a compressive pulse evolves into a wave train. This phenomenon was predicted by the Korteweg - de Vries equation and it has exactly the opposite behavior as that for a plasma composed only of positive ions. There is a critical value of the negative ion concentration for which a finite amplitude pulse propagates without steepening. M.G.

N83-31473# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
EAST-WEST PLASMA BUBBLE IRREGULARITY MOTION DETERMINED FROM SPACED VHF POLARIMETERS: VELOCITY SHEAR IN THE ZONAL F-REGION BULK PLASMA MOTION
M. A. Abdu, I. J. Kantor, I. S. Batista, and E. R. dePaula May 1983 27 p refs Submitted for publication
(INPE-2745-PRE/321) Avail: NTIS HC A03/MF A01

VHF electronic polarimeters were used to monitor Faraday rotation angle and amplitude of geostationary satellite (GOES-3) beacon signals, simultaneously at two stations, Cachoeira Paulista and Sao Jose dos Campos, separated by 110km exactly in the magnetic East-West direction in Brazil. The analysis of the data for a few months in 1981-82 period shows TEC fluctuations correlated with range type spread F events in the local ionograms and amplitude scintillation in the satellite beacon signals, thereby identifying themselves as eastward propagating plasma bubbles, and structures within them, in the equatorial ionosphere. The nighttime variation pattern in these velocities is in excellent agreement with those of the eastward bulk plasma motion measured by Jicamarca radar, the irregularity patch movement obtained from closely spaced antennas over Natal, the eastward airglow patch velocities determined from all-sky 6300 A images over Ascension Island, and the thermospheric zonal winds measured by Fabry-Perot interferometer over Kwajalein Atoll. There exist, however, significant differences in the values of the eastward velocities for these different cases. Author

N83-31474*# Colorado State Univ., Fort Collins. Dept. of Physics.
CURRENT COLLECTION FROM THE SPACE PLASMA THROUGH DEFECTS IN HIGH VOLTAGE SOLAR ARRAY INSULATION Ph.D. Thesis. Final Report
R. P. Stillwell Jan. 1983 103 p refs
(Grant NsG-3196)

(NASA-CR-168148; NAS 1.26:168148) Avail: NTIS HC A06/MF A01 CSCL 20I

For spacecraft operation in the near Earth environment, solar cell arrays constitute the major source of reliable long term power. Optimization of mass and power efficiency results in a general requirement for high voltage solar arrays. The space plasma environment, though, can result in large currents being collected by exposed solar cells. The solution of a protective covering of transparent insulation is not a complete solution, inasmuch as defects in the insulation result in anomalously large currents being collected through the defects. Tests simulating the electron collection from small defects in an insulation have shown that there are two major collection modes. The first mode involves current enhancement by means of a surface phenomenon involving the surrounding insulator. In the second mode the current collection is enhanced by vaporization and ionization of the insulators materials, in addition to the surface enhancement of the first mode. A model for the electron collection is the surface enhanced collection mode was developed. The model relates the secondary electron emission yield to the electron collection. It correctly predicts the qualitative effects of hole size, sample temperature and roughening of sample surface. The theory was also shown to predict electron collection within a factor of two for the polymers teflon and polyimide. Author

N83-31475*# National Aeronautics and Space Administration, Washington, D. C.

NUMERICAL ANALYSIS OF PLASMA FLOWS IN AN MPC DUCT WITH DIVERTER

V. V. Badin May 1983 24 p refs Transl. into ENGLISH of "Chislennoye Issledovaniye Techeniy Plazmy v Kanale MPK s Divertorom" Preprint 131 Moscow, 1982 p 1-25 Transl. by Scientific Translation Service, Santa Barbara, Calif.

(Contract NASw-3542)

(NASA-TM-77222; NAS 1.15:77222) Avail: NTIS HC A02/MF A01 CSCL 20I

The two-dimensional MHD-flow of the ideal plasma in a channel of the magnetoplasma compressor (MPC) with an axial hole in the central electrode (divertor) is numerically simulated. The steady-state regime of the flow is obtained. The influence of finite and periodical density perturbation at the entry of the channel on the compressional flow properties is investigated. It is shown that the flow is stable under such perturbations. Author

N83-31476# Naval Research Lab., Washington, D. C. Plasma Theory Branch.

NUMERICAL SIMULATION OF THE AXISYMMETRIC HOLLOWING INSTABILITY Interim Report

G. Joyce and M. Lampe 14 Apr. 1983 41 p refs

(ARPA Order 4395)

(AD-A126937; NRL-MR-5053) Avail: NTIS HC A03/MF A01 CSCL 20/9

Recent simulations have indicated that highly current-neutralized charged particle beams propagating in an ionizable gas are subject to violent axisymmetric instabilities. We show that these instabilities are excitations of the m = O, n = 2 hollowing mode, for which there is no adequate analytic theory. We present results of a wide-ranging simulation study of the instability mechanism and the parameter range of the instability. GRA

N83-31477# Texas Univ., Austin.

KINETIC THEORY OF ALFVEN WAVES

S. M. Mahajan Mar. 1983 50 p refs

(Contract DE-FG05-80ET-53088)

(DE83-009162; DOE/ET-53088/84) Avail: NTIS HC A03/MF A01

The addition of electron parallel dynamics in the description of an inhomogeneous current carrying cylindrical plasma is shown to replace the magnetohydrodynamic continuum, associated with Alven waves, by a discrete spectrum. The spectrum of the resulting discrete modes is determined analytically and numerically. DOE

N83-31478# Princeton Univ., N. J. Plasma Physics Lab.

RADIO-FREQUENCY ENERGY IN FUSION POWER GENERATION

John Q. Lawson, W. R. Becraft (General Electric Co., Schenectady, N.Y.), and D. J. Hoffman (ORNL) 1983 7 p refs Presented at the 5th Topical Meeting on Technol. of Fusion Energy, Knoxville, Tenn., 26 Apr. 1983

(Contract W-7405-eng-26)

(DE83-012067; CONF-830406-34) Avail: NTIS HC A02/MF A01

The history of radio-frequency (RF) energy in fusion experiments is reviewed, and the status of current efforts is described. Potential applications to tasks other than plasma heating are described, as are the research and development needs of RF energy technology. DOE

N83-31479# Oak Ridge National Lab., Tenn.

FIFTH TOPICAL MEETING ON THE TECHNOLOGY OF FUSION ENERGY

Apr. 1983 566 p refs Meeting held in Knoxville, Tenn., 26-28 Apr. 1983 Sponsored in part by the American Nuclear Society, Oak Ridge-Knoxville Section, Office of Fusion Energy of DOE, and EPRI

(Contract W-7405-eng-26)

(DE83-004943; CONF-830406-Absts) Avail: NTIS HC A24/MF A01

Abstracts are presented of the approximately 250 papers that were presented at the conference. Some of the main topics included the following: (1) next generation devices, (2) tritium, (3) hybrids, (4) alternate fuels, (5) materials engineering, (6) blanket and first wall engineering, and (7) inertial confinement. DOE

N83-31480# Los Alamos Scientific Lab., N. Mex.

CURRENT MEASUREMENTS BY FARADAY ROTATION IN SINGLE-MODE FIBERS

G. I. Chandler and F. C. Jahoda 1983 11 p refs Presented at the Los Alamos Conf. on Optics, Santa Fe, N. Mex., Apr. 1983

(Contract W-7405-eng-36)

(DE83-011318; LA-UR-83-1010; CONF-830425-16) Avail: NTIS HC A02/MF A01

Faraday rotation in optical fibers can be a useful diagnostic for large currents in magnetic fusion devices. Currents in the several hundred kiloamp range, with tens of nanoseconds risetime, were measured using simple polarimetric techniques. L.F.M.

N83-31481# California Univ., Livermore. Lawrence Livermore Lab.

SYMPOSIUM: NEW TRENDS IN UNCONVENTIONAL APPROACHES TO MAGNETIC FUSION

R. F. Post 5 Apr. 1983 24 p Symp. held in Stockholm, 16-18 Jun. 1982 Submitted for publication

(Contract W-7405-eng-48)

(DE83-010064; CONF-830623-1; UCRL-89018) Avail: NTIS HC A02/MF A01

An extensive review of the meeting is given. The concepts discussed included reverse-field pinches, compact tori, advanced stellarators, multipoles, surface magnetic confinement systems, the bumpy torus, and a collection of mirror-based approaches. DOE

N83-31482# California Univ., Los Angeles. Dept. of Mechanics and Structures.

PLASMA-SURFACE INTERACTIONS IN MAGNETIC-FUSION SYSTEMS Annual Report

Robert W. Conn 1982 45 p refs

(Contract DE-AT03-80ER-52062)

(DE83-010046; DOE/ER-52062/T1) Avail: NTIS HC A03/MF A01

The general scope of the work has been to develop the understanding of the plasma boundary and plasma-wall interactions through theory and computer modelling research on plasma edge physics, on the role of electric potentials at boundaries, on neutral-gas recycle including atmomic and surface-physics processes, on neutral-atom transport in plasmas. on neutral-atom flows in ducts connected to components such as pump limiters or

divertors, and on techniques to modify plasma particle and heat flows in the edge in order to make the particle and heat fluxes to components more manageable. The possibility of simulating in a benchtop experiment some key physics and engineering issues was also investigated. DOE

N83-31483# Stanford Univ., Calif. High Temperature Gasdynamics Lab.

THE SUPPRESSION OF TURBULENCE IN COMBUSTION-DRIVEN MAGNETOHYDRODYNAMIC FLOWS

John C. Reis Jan. 1983 192 p refs

(Contract DE-AC01-80ET-15611)

(DE83-007902; DOE/ET-15611/T8; HTGL-TR-2-83) Avail: NTIS HC A09/MF A01

The influence of a transverse magnetic field on velocity fluctuations in a combustion driven magnetohydrodynamic (MHD) flow has been experimentally and theoretically investigated and compared to that in liquid metal MHD flows. The measurements were made with a laser Doppler velocimeter in the Stanford M-2 MHD facility. A comparison of the measured mean velocity profiles, with and without magnetic field, indicated only a slight trend toward a more laminar shape, and substantially less change than in liquid metal flows. The turbulence intensity profiles indicated the same degree of suppression in the core, but substantially less suppression in the boundary layers in comparison to liquid metal flows. The difference is attributed to a reduced electrical conductivity in the boundary layer of the combustion driven flows. A second difference between combustion driven and liquid metal MHD flows is that the combustion generated turbulence was dominated by long streamers. A theoretical model for turbulence suppression of the combustion streamers was developed. DOE

N83-31484# Columbia Univ., New York. Plasma Physics Lab.

SUPERFAST Z-PINCH-PRODUCED PLASMAS Ph.D. Thesis

Warren W. Hsing 1983 117 p refs

(Contract DE-AC02-80ER-10613)

(DE83-009278; DOE/ER-10613/2) Avail: NTIS HC A06/MF A01

The superfast z-pinch was investigated as a possible means of producing an ultra-high (100 keV) temperature plasma. An ion Vlasov fluid electron code is shown to simulate the experimental behavior of a pinch. Dependence of the temperature on wall generated impurity, initial density profile, and generator parameters are indicated. Extrapolation of the code using state of the art pulse generators indicate feasibility of an ultra-high temperature plasma. DOE

N83-31485# California Univ., Livermore. Lawrence Livermore Lab.

PHYSICS OF LASER FUSION. VOLUME 4: THE FUTURE DEVELOPMENT OF HIGH-POWER SOLID-STATE LASER SYSTEMS

J. L. Emmett, W. F. Krupke, and J. B. Trenholme 1982 76 p

(Contract W-7405-eng-48)

(DE83-009211; UCRL-53344-Vol-4) Avail: NTIS HC A05/MF A01

Solid state lasers, particularly neodymium glass systems, have undergone intensive development during the last decade. Solid state laser technology is reviewed in the context of high peak power systems for inertial confinement fusion. Specifically addressed are five major factors: efficiency, wavelength flexibility, average power, system complexity, and cost; these factors today limit broader application of the technology. It is concluded that each of these factors can be greatly improved within current fundamental physical limits. It is further concluded that the systematic development of new solid state laser media, both vitreous and crystalline, should ultimately permit the development of wavelength flexible, very high average power systems with overall efficiencies in the range of 10 to 20%. DOE

N83-31486# California Univ., Livermore. Lawrence Livermore Lab.

DYNAMIC GAS FLOW DURING PLASMA OPERATION IN TMX-U

W. L. Pickles, M. R. Carter, C. A. Clower, R. P. Drake, A. L. Hunt, T. C. Simonen, and W. C. Turner 12 Nov. 1982 18 p refs Presented at 29th Natl. Symp. on Am. Vacuum Soc., Baltimore, 16 Nov. 1982

(Contract W-7405-eng-48)

(DE83-000709; UCRL-87766; CONF-821111-14) Avail: NTIS HC A02/MF A01

Control of the neutral density outside of the plasma radius is essential for proper operation of the various plasma configurations in tandem mirror experiment (TMX-U). TMX-U excess beam, stream gun, gas box, and beam reflux gases are pumped internally in regions defined by 73 degree Ti-gettered liners and warm Ti-gettered plasma liners. The array of fast and slow ion gauges was used to measure the dynamic pressure in many of the liner defined regions on three time scales. The natural divertor action, or plasma pump effect, of mirror plasmas were measured using the ion gauge diagnostics on a fast time scale. Routine operation of TMX-U is enhanced by the ability to verify the effectiveness of gettering and to locate leaks using pressure data collected on the two slow time scales. A computer code, DYNAVAC 6, which treats TMX-U as a set of conductance coupled regions with pumping and sources in each region, was used to successfully model the overall gas dynamics. DOE

N83-31487# Illinois Univ., Urbana-Champaign. Fusion Studies Lab.

STABILITY OF HIGH-BETA TOKAMAKS WITH RESPECT TO PELLET INJECTION Ph.D. Thesis

William Choate Tetley 1983 34 p refs

(Contract DE-AC02-76ET-52040)

(DE83-002912; DOE/ET-52040/266; COO-2218-266) Avail: NTIS HC A03/MF A01

During the course of a long pulse or steady state operation, the fuel in a plasma becomes depleted. This necessitates the refueling of the reactor. Several methods were proposed. The use of pellet injection in a high toroidal beta Tokamak is explored. Specifically the effect on stablity is studied. Limits on the beta are found with respect to the size of the pellet injected. The device studied is the proposed upgrade of the Doublet III. The principal conclusion is that the stable beta is dependent on the shape of the current profile, and that by flattening the profile the plasma stability is increased. DOE

N83-31488# Hanford Engineering Development Lab., Richland, Wash.

TRACK-MOUNTED REMOTE HANDLING SYSTEM FOR THE TOKAMAK FUSION ENGINEERING TEST

V. P. Kelly, J. D. Berger, R. L. Daubert, and J. A. Yount 1982 8 p refs Presented at Am. Nucl. Soc. Winter Meeting, Washington, D.C., 14 Nov. 1982

(Contract DE-AC06-76FF-02170)

(DE83-003371; HEDL-SA-2715-FP; CONF-821103-30) Avail: NTIS HC A02/MF A01

Concepts for remote handling machines (IVM) designed to transverse the interior of toroidal vessels with guidance and support from track systems have been developed for the proposed Tokamak Fusion Engineering Test (TFET). TFET was proposed as an upgrade for the Tokamak Fusion Test Reactor (TFTR), currently nearing completion. The track mounted IVMs were conceived to perform in vessel remote maintenance for TFET, including removal and replacement of pump limiter blades and protective tiles as well as other maintenance related tasks such as vessel wall inspection leak testing and interior cleanup. The conceptual IVMs consist of three manipulator arms mounted on a common frame member: a single power manipulator arm with high load carrying capacity and two lower capacity servomanipulator arms. Descriptions of the IVM concepts, in vessel track systems, and ex-vessel handling systems are presented. DOE

N83-31489# California Univ., Livermore. Lawrence Livermore Lab.

CONTINUOUS CRYOPUMP FOR STEADY-STATE MIRROR FUSION REACTORS

T. H. Batzer and W. R. Call 20 Sep. 1982 17 p refs Presented at 29th Natl. Symp. on Am. Vacuum Soc., Baltimore, 16 Nov. 1982
(Contract W-7405-eng-48)
(DE83-001497; UCRL-87732; CONF-821111-10) Avail: NTIS HC A02/MF A01

The characteristics of Mirror Fusion Reactors, i.e., steady state operation, a low neutral gas density and a large gas through-put require unique vacuum pumping capabilities. One approach that appears to meet these requirements is a liquid helium cooled cryo-pump system in which a fixed portion is isolated and degassed while the remainder continues to pump. The time to degas a rotating, fixed portion of the pumping area and the ratio of that area to the total area fixed the gas inventory in the chamber. The active pump area maintains the required neutral gas density and the time averaged degassing rate equals the gas throughput. A cryopump whereby the gas condensed (deuterium) on the liquid helium cooled panel is transferred to a collector pump and subsequently to an exterior mechanical pump and exhausted. At panel loadings as high as .55 torr-litres/square cm the gas leakage during degassing is less than 8% and the degassing time is less than 10 minutes. DOE

N83-31490# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
REVIEW OF IMPACT EXPERIMENTS ON THE CRITICAL IONIZATION VELOCITY
Nils Brenning Oct. 1982 41 p refs Presented at Workshop on Alfvens Critical Velocity Effect, Garching, West Germany, 11-13 Oct. 1982 Sponsored by Swedish Natural Science Research Council
(TRITA-EPP-82-14; ISSN-0348-7539) Avail: NTIS HC A03/MF A01

Experiments in which a highly ionized plasma impacts on a neutral gas cloud are reviewed. Critical ionization velocity interaction is observed only when the magnetic field, and the neutral gas density, are above certain limits. The values of these limits, however, differ between the experiments. The extrapolation of the laboratory results to space applications is discussed. Author (ESA)

N83-30475# Ruhr Univ., Bochum (West Germany).
COLLABORATION IN THEORETICAL PLASMA PHYSICS BETWEEN THE PHYSICAL RESEARCH LABORATORY IN AHMEDABAD, INDIA AND THE SONDERFORSCHUNGSBEREICH 162 AT THE RUHR-UNIVERSITAET BOCHUM, WEST GERMANY AND THE DFVLR-INDIAN SPACE RESEARCH ORGANIZATION (ISRO) COLLABORATION CONTRACT DURING THE YEARS 1978-1981
G. Ecker *In* DFVLR DFVLR/ISRO Colloq. About a Decade of Cooperation in the Field of Space Res. and Technol. Jan. 1983 p 121-127 refs (For primary document see N83-30466 19-12)
Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 35,20

N83-30476# Physical Research Lab., Ahmedabad (India).
INDIAN SPACE RESEARCH ORGANIZATION (ISRO)-DFVLR COLLABORATION IN SPACE SCIENCES
D. Lal, R. V. Bhonsle, S. P. Gupta, and B. H. Subbaraya *In* DFVLR DFVLR/ISRO Colloq. About a Decade of Cooperation in the Field of Space Res. and Technol. Jan. 1983 p 129-139 (For primary document see N83-30466 19-12)
Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 35,20

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N83-31491# British Library Lending Div., Boston Spa (England).
INVESTIGATION OF UNIFORMITY OF Te-10 PERCENT (ATOM.) Se SOLID SOLUTION OBTAINED BY CRYSTALLIZATION UNDER CONDITIONS OF WEIGHTLESSNESS
Yu. S. Avraamov, S. B. Felgina, A. S. Okhotin, and A. I. Melashenko 1983 7 p Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved. Chem. Met. (USSR) p 88-91
(BLL-M-34938-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

Ingots of a solid solution of 10% (atom.) of selenium in tellurium obtained by directional solidification on Earth and under zero-gravity conditions in an orbiting space station were examined by X-ray spectral micro-analysis. It was found that in the initial zone of the space-crystallized ingot the average selenium concentration is higher and the distribution less uniform than that obtained under terrestrial crystallization conditions. Author

N83-31492# Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
BANDWIDTH NARROWING IN N-TYPE MANY-VALLEY SEMICONDUCTORS. 2: A SELF-CONSISTENT MANY-BODY AND UNRESTRICTED HARTREE-FOCK CLUSTER APPROACHES
M. Fabbri and A. Ferreira daSilva Jul. 1983 25 p refs Presented at 35th SBPC Meeting Submitted for publication
(INPE-2802-PRE/362) Avail: NTIS HC A02/MF A01

A recent one-band model for impurity states in n-type many-valley semiconductors was extended by self-consistent many-body and unrestricted Hartree-Fock aproaches. These formulations are presented in order to discuss the shallow donor states in semiconductors. The impurity band splits into two Hubbard bands, presenting different aspects of the impurity states when the many-valley effects of the host conduction band are considered. These effects turn out to be essential for a better interpretation of the theoretical and experimental results. The results agree with some theoretical calculations and experimental findings. M.S.

N83-31493*# National Aeronautics and Space Administration, Washington, D. C.
SOLITONS IN SEMICONDUCTORS WITH A SUPERLATTICE
A. P. Tetervov May 1983 11 p refs Transl. into ENGLISH from Ukr. Fiz. Zh. (USSR), v. 23, no. 7, Jul. 1978 p 1182-1187 Original language document was announced as A78-51656 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77075; NAS 1.15:77075) Avail: NTIS HC A02/MF A01 CSCL 20L

The nonlinear parabolic equation describing the propagation of the electromagnetic wave in a semiconductor with the superlattice is analyzed. The possibility of the existence of the solitary waves is proved both for a small amplitude of the electrical field and the latter moderate values. Author

N83-31494# Rockwell International Corp., Thousand Oaks, Calif. Science Center.
RESEARCH ON THE CRYSTAL GROWTH AND DIELECTRIC PROPERTIES OF HIGH PERMITTIVITY FERROELECTRIC MATERIALS Annual Technical Report, 1 Mar. 1982 - 28 Feb. 1983
R. R. Neurgaonkar Mar. 1983 40 p refs
(Contract N00014-81-C-0463)
(AD-A127287; SC5345.3AR) Avail: NTIS HC A03/MF A01 CSCL 20/2

The systems investigated for potential millimeter wave applications are the stuffed tungsten bronze single crystal BSKNN, and the modified lead niobate ceramics PKLN and PBN. Low frequency and millimeter wave dielectric measurements show these materials to be promising for future applications. The observed high absorptive loss (tan delta approximately 0.2) and rapidly decreasing permittivities at GHz frequencies for these initial samples may be due to piezoelastic coupling to heavily damped elastic waves through localized defects. Work on the hot-pressed growth of PKLN and PBN ceramics shows this technique to be very promising for the enhancement of the dielectric properties of these lead-containing compositions, although cracking of PKLN is presently a problem due to its orthorhombic structure. GRA

N83-31495# Spire Corp., Bedford, Mass.
HgCdTe FABRICATION USING DIRECTED ENERGY TECH-

NIQUES Final Technical Report
Anton C. Greenwald and Robert G. Wolfson Feb. 1983 60 p refs Prepared in cooperation with New England Research Center, Inc., Sudbury, Mass.
(Contract MDA903-81-C-0410; ARPA Order 3800)
(AD-A126910; SPIRE-FR-83-10082) Avail: NTIS HC A04/MF A01 CSCL 17/5

The goal of this research was to produce large-area, thin-film single-crystal HgCdTe material for infrared detectors. Single-crystal CdTe films were deposited by heteroepitaxial evaporation on muscovite mica substrates, and subsequently converted to single-crystal Hg(1-x) Cd(x) Te by vapor exchange at a constant temperature. These films had excellent stoichiometry, uniform composition, and good electrical properties; however, the films were not useful on the mica substrates nor were they successfully transferred to other substrates. Attempts at depositing single-crystal CdTe films on sapphire, BaF2' zirconia, and quartz were unsuccessful. Attempts to grow single-crystal CdTe films on sapphire by liquid-phase epitaxy using pulsed electron beams to melt thin deposited films were also unsuccessful. It is believed that the goals of this program could be met by a different evaporation furnace design which would allow in situ cleaning of the substrate surface. Author (GRA)

N83-31496# Argonne National Lab., Ill. Materials Science Div.
POSITRON-ANNIHILATION SPECTROSCOPY OF VACANCY DEFECTS IN ALUMINUM
B. Chakraborty, S. Berke (Brandeis Univ.), M. J. Fluss, K. Hoffmann (Brandeis Univ.), P. Lippel (Brandeis Univ.), and R. W. Siegel Jun. 1982 17 p refs Presented at 2nd Natl. Symp. on Positron Annihilation, Madras, 8 Feb. 1982
(Contract W-31-109-eng-38; Grant NSF DMR-79-26035)
(DE83-007628; CONF-820274-2) Avail: NTIS HC A02/MF A01

Positron-annihilation characteristics in a monovacancy and a divacancy in aluminium were calcutted self-consistently using a local density functional formalism, into which the many-body enhancement effects were incorporated. Results for the theoretical two-dimensonal angular correlation of annihilation radiation spectra are compared to experimental results obtained from an aluminum single crystal at 200C, where positrons annihilate from a Block-state, and at higher temperatures, 5000C and 6300C, where they annihilate primarily from vacancy-trapped states. DOE

N83-31497# Argonne National Lab., Ill. Materials Science Div.
SUPERCONDUCTIVITY IN Au-Cr-Au AND Ag-Pd-Ag EPITAXIAL METAL FILM SANDWICHES
M. B. Brodsky and H. C. Hamaker Jul. 1982 9 p refs Presented at 4th Conf. on Superconductivity in d- and f-band metals, Karlsruhe, West Germany, 28-30 Jun. 1982
(Contract W-31-109-eng-38)
(DE83-007608; CONF-820659-8) Avail: NTIS HC A02/MF A01

Thin layers (1-2 nm) of Cr and Pd were grown in Epitaxial Metal Film Sandwiches (EMFS) with Au or Ag, respectively. Half of the Au-Cr-Au samples and one Ag-Pd-Ag sample were superconductors. Cr grows in an fcc structure and Pd is in a stretched lattice, as was observed for Au-Pd-Au. Highest observed T/sub c/'s are 3.000 K for Au-Cr-Au and 2. 150 K for Ag-Pd-Ag. All nonsuperconducting samples exhibit resistivity minia due to local moments. Large orbital contributions to H/sub c/2 are observed: 42 KOe/K for Ag-Pd-Ag being measured with T/sub c/'s approx. = 1 K, and a N(E/sub F/) for fcc CR of 2.1 states/eV. The results are discussed relative to preliminary data for Au-V-Au Ag-V-Au and Ag-V-ag EMFS. DOE

N83-31498# Brookhaven National Lab., Upton, N. Y.
SOME BASIC QUESTIONS IN ORGANIC SUPERCONDUCTIVITY
V. J. Emery 1982 7 p refs
(Contract DE-AC02-76CH-00016)
(DE83-008584; BNL-32590) Avail: NTIS HC A02/MF A01

Several questions of current interest in the theory or organic superconductors are discussed. Particular attention is paid to the importance of low dimensional physics, electron-electron interactions, and the specific role of the anions. DOE

N83-31499# Argonne National Lab., Ill.
BAND MODEL FOR D- AND F- METALS
D. D. Koelling 1982 98 p refs Presented at NATO Advan. Study Inst. Conf. on the Electron. Structure of Complex Systems, Ghent, 12 Jul. 1982
(Contract W-31-109-eng-38)
(DE83-3008658; CONF-820776-1) Avail: NTIS HC A05/MF A01

The application of band theory to metallic systems with d and f orbitals in the valence and conduction bands is discussed. Because such an application pushes theory and technique to their limits, several important features are briefly recapitulated. Within the transition metal systems, the elemental systems are used to discuss the fundamental formalism being applied and the newer directions into more complex systems are mentioned. Here the focus is on anisotropic properties and Fermi surface properties. Within the f orbital systems, the focus is more on Ce and its compounds because of current interest with a relatively brief discussion of the actinides. The point of view advanced, however, has its origins in actinide research. DOE

N83-31500# Hebrew Univ., Jerusalem (Israel). School of Applied Science and Technology.
ANALYSIS OF DIFFRACTION FROM [001] TWIST BOUNDARIES IN CUBIC METALS
A. Brokman and R. W. Balluffi (MIT) Feb. 1983 35 p refs
(Contract DE-AC02-78ER-05002)
(DE83-008757; DOE/ER-05002/32) Avail: NTIS HC A03/MF A01

A relatively simple model for boundary structure involving rotational relaxations around O lattice elements in the boundary core was employed to analyze diffraction from [001] twist boundaries in fcc metals. Grain boundary diffracted intensity on a grain boundary diffraction lattice in reciprocal space was obtained. This lattice consisted of an array of line elements running parallel to the twist axis in a square pattern corresponding to the reciprocal lattice of the coincidence site lattice lying parallel to the grain boundary plane. The analytical model predicts the presently available main features of experimentally observed diffracted intensities and also those obtained by computer simulation calculations and clearly reveals the physical origins of the diffraction effects. The generalization of the analytical model to include any type of boundary is indicated. DOE

N83-31501# Argonne National Lab., Ill. Materials Science Div.
IMPURITY DIFFUSION IN TRANSITION-METAL OXIDES
N. L. Peterson Jun. 1982 44 p refs Presented at the 2nd Intern. Conf. on Transport in Non-Stoichiometric Compounds, Perpignan, France, 28 Jun. 1982
(Contract W-31-109-eng-38)
(DE83-007617; CONF-8206160-1) Avail: NTIS HC A03/MF A01

Intrinsic tracer impurity diffusion measurements in ceramic oxides have been primarily confined to CoC, NiO, and Fe304. Tracer impurity diffusion in these materials and TiO2, together with measurements of the effect of impurities on tracer diffusion (Co in NiO and Cr in CoO), are reviewed and discussed in terms of impurity defect interactions and mechanisms of diffusion. Divalent impurities in divalent solvents seem to have a weak interaction with vacancies whereas trivalent impurities in divalent solvents strongly influence the vacancy concentrations and significantly reduce solvent jump frequencies near a trivalent impurity. Impurities with small ionic radii diffuse more slowly with a larger activation energy than impurities with larger ionic radii for all systems considered in this review. Cobalt ions (a moderate size impurity) diffuse rapidly along the open channels parallel to the c-axis in TiO2 whereas chromium ions (a smaller sized impurity) do not. DOE

N83-31502# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.
NONDESTRUCTIVE TESTING OF METALLIC SHEATH FOR

INTERNALLY COOLED SUPERCONDUCTOR
R. W. McClung, K. V. Cook, C. V. Dodd, and J. H. Smith 1983 7 p refs Presented at the 5th Topical Meeting on Technol. of Fusion Energy, Knoxville, Tenn., 26 Apr. 1983
(Contract W-7405-eng-26)
(DE83-011397; CONF-830406-35) Avail: NTIS HC A02/MF A01

For quality assurance in the Oak Ridge National Laboratory Large Coil Program, we developed ultrasonic and eddy current techniques to examine the JBK-75 alloy sheath for superconducting cable for a large magnet. Ultrasound was used to examine the strip before forming into the sheath, and eddy currents were used to examine the seam weld after the sheath had been formed around the cable. DOE

N83-31503# Oak Ridge National Lab., Tenn. Fusion Engineering Design Center.
POLOIDAL FIELD SUPERCONDUCTING RING COIL CASE AND SUPPORT STRUCTURE DESIGN
R. J. Hooper and B. L. Hunter 1983 7 p refs Presented at the 5th Topical Meeting on Technol. of Fusion Energy, Knoxville, Tenn., 26 Apr. 1983
(Contract W-7405-eng-26)
(DE83-011395; CONF-830406-33) Avail: NTIS HC A02/MF A01

Conceptual design studies have been carried out at the Fusion Engineering Design Center on a succession of Tokamak devices. In order to quickly assess the technical feasibility and to estimate the costs of competing poloidal field systems, it is desirable to develop simple, but accurate, rules for the structural design of these coils. In this paper we describe the rules developed for superconducting ring coils and illustrate their application to a specific example. This methodology may be easily adapted to resistive ring coil design. DOE

N83-31504# Pennsylvania Univ., Philadelphia. Dept. of Materials Science and Engineering.
ATOMISTIC STUDIES OF GRAIN BOUNDARIES WITH SEGREGATED IMPURITIES Progress Report, 1 Jul. 1982 - 30 Jun. 1983
V. Vitek Feb. 1983 19 p refs
(Contract DE-AC02-79ER-10429)
(DE83-007982; DOE/ER-10429/4) Avail: NTIS HC A02/MF A01

An extensive multiplicity of grain boundary structures occurs in general boundaries. Transformations between different structures occur through absorption or emission of vacancies. As the concentration of the solutes in the boundary increases two dimensional ordered structures are formed whose crystallography is governed by the structure of the originally pure boundary and the solute-solute interaction. In the case of an alloy where ordering is unfavorable, these structures correspond to the maximum concentration which is achieved by exchange of solvent and solute atoms. However, if ordering is favored, these ordered structures may extend further into the lattice on each side of the boundary. Significant changes occur in the boundary structure during segregation. The relative displacement of the grains changes. Transformations into other possible multiple structures are often induced and new structures is stabilized. This implies that the extensive multiplicity of structures is reduced which may lead to significant decrease in the ability of boundaries to absorb or emit vacancies. DOE

N83-31505# Geneva Univ. (Switzerland).
MAGNETIC ORDERING AND ELECTRONIC STRUCTURE OF CeAl2
T. Jarlborg, A. J. Freeman (Northwestern Univ., Evanston, Ill.), and D. D. Koelling (Argonne National Lab.) 1982 5 p refs Presented at the Intern. Conf. on the Impact of Polarized Neutrons on Solid State Chem. and Phys., Grenoble, France, 15 Oct. 1982
(Contract W-31-109-eng-38)
(DE83-007827; CONF-821057-2) Avail: NTIS HC A02/MF A01

CeAl2 has attracted considerable attention because of its unusual properties including a proposed competition between Kondo and anti-ferromagnetic spin density wave ordering observed at low temperatures. Here we present results of a self consistent spin polarized linear muffin tin orbital band study of CeAl2. In its paramagnetic state the Ce-f band is about 1 eV wide and, although principally above E/sub F/, it accommodates the additional 4f electron when compared to LaAl2 and gives rise to a very high DOS at E/sub F/. The ferromagnetic state is found not to be stable. By contrast, the anti-ferromagnetic state is found to be stable with a magnetic moment of 0.88 mu/sub B/ per Ce atom in very good agreement with neutron measurements by Barbara, et al. Surprisingly, the anti-ferromagnetic spin-density ordering appears to be related to nesting features in the underlying Fermi surface in LaAl2 (i.e., no 4f electron) rather than that of CeAl2. DOE

N83-31506# Technischer Ueberwachungs-Verein Bayern e.V., Munich (West Germany).
MAGNETIC HYPERFINE FIELDS IN Dy/SUB 1-x/Y/SUB x/Al2
A. Hessel, G. M. Kalvius, G. K. Shenoy (ANL), W. Zinn (IFF-KFA Juelich), and W. Wiedemann 1982 8 p refs Presented at the IUPAP Intern. Conf. on Magnetism, Kyoto, 6 Sep. 1982 Prepared in cooperation with Bayerische Akademie der Wissenschaften
(DE83-007765; CONF-8200929-10) Avail: NTIS HC A02/MF A01

Dy Moessbauer spectroscopy was carried out at 4.2 K on Dy(1-x)Y(x)Al2 for 0 < or = x < or = 0.6. For x = o it was found that B = 580 T and f sub Q = 2810 MHz, close to free ion values. For x > o both B and f sub q decrease weakly. The result indicate that (delta B) sub n = -14 T, (delta f sub Q) sub n = -110 MHz and (delta B) sub nn = 1.6 T, (delta f sub Q) sub nn = 4 MHz per replaced nearest and next-nearest Dy (3+) neighbor, respectively. DOE

N83-31507# Los Alamos Scientific Lab., N. Mex.
ELECTRONIC STRUCTURE AND BONDING IN TRANSURANICS: COMPARISON WITH LANTHANIDES
John W. Ward 1983 19 p refs Presented at the 16th Rare Earth Res. Conf., Tallahassee, 18-21 Apr. 1983
(Contract W-7405-eng-36)
(DE83-007549; LA-UR-83-352; CONF-830419-1) Avail: NTIS HC A02/MF A01

The physico-chemical properties of the actinide metals, alloys, and compounds show interesting parallels and contrasts with the rare earths, beyond uranium. At first there is a transition region where the unique bonding properties of the early actinides become less prominent, due to progressive f-electron localization. Nevertheless, in contrast to the rare earths, f-electron energies remain close to the Fermi level, resulting in complex behavior as a function of temperature, pressure and structure. Particularly interesting in this region are the metallic hydrides, whose chemistry is clearly rare-earth like, but whose electronic properties are entirely different. DOE

N83-31508# Sandia Labs., Albuquerque, N. Mex.
ATOMIC INTERDIFFUSION IN Au/AMORPHOUS NiNb/ SEMICONDUCTOR SYSTEMS
B. L. Doyle, P. S. Peercy, R. E. Thomas (Wisconsin Univ., Madison), J. H. Perepezko (Wisconsin Univ., Madison), and J. D. Wiley (Wisconsin Univ., Madison) 1982 23 p refs Presented at the 6th Intern. Symp. on the Sci. Basis for Radioactive Waste Management, Boston, 1 Nov. 1982
(Contract DE-AC04-76DP-00789)
(DE83-001553; SAND-82-1587C; CONF-821107-20) Avail: NTIS HC A02/MF A01

Backscattering measurements were performed to assess the stability of amorphous NiNb for contacts of high temperature electonics. The interdiffusion of amorphous NiNb and three semiconductors - Si, GaAs and GaP - was measured to study the stability for primary metallization applications. Diffusion of Au with amorphous NiNb and the same three semiconductors were also investigated in order to address diffusion barrier applications of amorphous metals. Results indicate that the use of amorphous NiNb as a contact or a diffusion barrier could extend the useful operation temperature range for GaP devices to above 550 C. DOE

N83-31509# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
ELECTRONIC ENERGY TRANSFER FROM MOLECULES TO METAL AND SEMICONDUCTOR SURFACES, AND CHEMISORPTION-INDUCED CHANGES IN OPTICAL RESPONSE OF THE NICKEL (111) SURFACE Ph.D. Thesis
Paul Michael Whitmore Oct. 1982 197 p refs
(Contract DE-AC03-76SF-00098)
(DE83-003757; LBL-15092) Avail: NTIS HC A05/MF A01

The evolution of molecular excited states near solid surfaces is investigated. The mechanisms through which energy is transferred to the surface are described within a classical image dipole picture of the interaction. More sophisticated models for the dielectric response of the solid surface add important new decay channels for the energy dissipation. The predictions and applicability of three of these refined theories are discussed. DOE

N83-31510# California Univ., Livermore. Lawrence Livermore Lab. Dept. of Earth Sciences.
SIMILARITIES OF DISLOCATION-DEPENDENT DEFORMATION AND THERMODYNAMIC MODELS FOR SOLIDS AND LIQUIDS
R. B. Stout Jul. 1982 9 p refs Presented at the Intern. Conf. on Constitutive Laws for Eng. Mater.: Theory and Appl., Tucson, Ariz., 10 Jan. 1983
(Contract W-7405-eng-48)
(DE82-018066; UCRL-86966; CONF-830104-2) Avail: NTIS HC A02/MF A01

The model described dislocation density by a scalar function for the possible dislocation species. A Boltzmann type equation is developed to model the evolution of the scalar dislocation density function. The relative deformation between two atoms is modelled by a functional. This relative deformation has a continuum part and a discontinuum part. The functional models the discrete discontinuities of displacement between atomic planes as a result of dislocation kinetics. Physically, the elastic response of a material, whether solid or liquid, is modelled by the lattice structure deformation; and the non-elastic response, which is plasticity for solids or fluidity for liquids, is modelled by the dislocation dependent functional. The thermodynamic model assumes the existence of an internal energy functional. The methodology is primarily that established by Gibbs. DOE

N83-31511# Sandia Labs., Albuquerque, N. Mex.
SEARCH FOR VACANCIES IN LASER-ANNEALED SILICON
H. J. Stein and P. S. Peercy 1982 6 p refs Presented at the 6th Intern. Symp. on the Sci. Basis for Radioactive Waste Management, Boston, 1 Nov. 1982
(Contract DE-AC04-76DP-00789)
(DE83-001815; SAND-82-1432C; CONF-821107-15) Avail: NTIS HC A02/MF A01

In an effort to enhance vacancy trapping and detection in laser annealed Si, float zone Si was implanted with oxygen to achieve concentrations between one and two orders of magnitude greater than the equilibrium saturation limit. Oxygen, which is known to be an effective trap for vacanices, was found to incorporate efficiently into Si regrown with O switched laser annealing. Interstitial oxygen, oxygen vacancy defects and divacancies were observed after implantation. The laser regrown layers, however, were free of detectable vacancy associated defects. DOE

N83-31512# Sandia Labs., Albuquerque, N. Mex.
PHASE TRANSFORMATION UNDER INTENSE SHOCK PRESSURE LOADING
Donald E. Grady 1982 5 p refs Presented at the 6th Intern. Symp. on the Sci. Basis for Radioactive Waste Management, Boston, 1 Nov. 1982
(Contract DE-AC04-76DP-00789)
(DE83-001506; SAND-82-1317C; CONF-821107-16) Avail: NTIS HC A02/MF A01

Solids subjected to high velocity impact or explosive loading may undergo polymorphic phase transformation or melting within time periods appreciably less than 10 to the - eighth power due to the intense shock-pressure environment. Although criteria for equilibrium phase transformation on the Hugoniot are satisfied, other nonequilibrium features unique to the shock wave environment were identified in the shock transformation process. These features include shear and heterogeneous deformation effects which control the transformation kinetics and microstructure of the transformed materials. Transformation under shock loading leads to unusual microstructure in the recovered materials and can result in interesting and useful changes in physical and mechanical properties. DOE

N83-31513# Siemens A.G., Regensburg (West Germany). Unternehmensbereich Bauelemente.
DEVELOPMENT OF A METHOD FOR ANALYZING THE INTENSITY DEGRADATION OF LIGHT EMITTING DIODES Final Report, Jan. 1982
Hans-Hellmuth Cuno Bonn Bundesministerium fuer Forschung und Technologie Mar. 1983 75 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-007; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 15,50

In order to perform degradation experiments a measuring unit and burn-in places were constructed. The electronic circuits for the early recognition were developed and measurement series were performed. All experiments for an early recognition of an intensity degradation gave negative results. The hardware was used to determine the degradation behavior itself and the influence of characteristic values of the degradation. An influence of the orientation of the chips on the wafer relative to the crystal axes, which produces a 60% decrease in intensity degradation is revealed. Author (ESA)

N83-31514# Siemens A.G., Munich (West Germany). Geschaeftsgebeit Optonhalbleiter.
GALLIUM-ALUMINUM-ARSENIDE POWER INFRARED EMITTERS Final Report, May 1981
Joerg Aengenheister and Siegfried Leibenzeder Bonn Bundesministerium fuer Forschung und Technologie Apr. 1983 97 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-040; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 20,50

Two types of (Ga, Al)As light emitters for the unguided (via air) signal transmission were developed. Depending on the Al content they emit between 780 and 900 nm. The technology of these diodes is based on the liquid phase epitaxy process of (Ga, Al)As on GaAs with Si, Te and Zn as dopants and the diode preparation after removal of the GaAs substrate. The production process of the diodes, and their electrical and optical properties are reported. The efficiencies and the optical modulation bandwidth depend on the wavelength and on the species and concentration of the dopants. At 870 nm peak emission wavelength efficiencies of 20% at risetime of 300 nsec and 10% at 20 nsec respectively are obtained and are reproducible. Author (ESA)

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N83-31515# British Library Lending Div., Boston Spa (England).
THERMODYNAMICS AND HEAT AND MASS TRANSFER
A. S. Telegin, V. S. Shvydskii, and Yu. G. Yaroshenko 1983 7 p Transl. into ENGLISH from Stal. (USSR), no. 7, 1982 p 90-91
(BLL-M-35015-(5825.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The basic concepts and laws of thermodynamics, the theory of thermal conductivity, the theory of heat transfer by convection and radiation, and the physical fundamentals of the theory of mass transfer are considered. The layer processes extensively used in metallurgy and other branches of engineering are described.
Author

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N83-31516# British Library Lending Div., Boston Spa (England).
INTRODUCTION OF ACHIEVEMENTS OF SCIENCE AND ENGINEERING AT IRON AND STEEL ENTERPRISES
M. V. Malakhov 14 Jun. 1983 10 p Transl. into ENGLISH from Stal (USSR), no. 7, 1982 p 93-94
(BLL-M-35016-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

A general examination is made of the work carried out by research and planning institutes and by enterprises of the Soviet iron and steel industry into implementing the latest achievements and developments in science and engineering. Progress made in 1981 is discussed and the economic effect from introducing new technology and improving efficiency is indicated. Further measures needed in 1982 are outlined. Author

N83-31517*# National Aeronautics and Space Administration, Washington, D. C.
THE PLANNING AND CONTROL OF NASA PROGRAMS AND RESOURCES
Jul. 1983 42 p Supersedes NASA-TM-83090
(NASA-TM-85840; NAS 1.15:85840) Avail: NTIS HC A03/MF A01 CSCL 05A

The major management systems used to plan and control NASA programs and resources are described as well as their integration to form the agency's general management approach in carrying out its mission. Documents containing more detailed descriptions of the processes and techniques involved in the agency's major management systems are listed. A.R.H.

N83-31518# Logistics Management Inst., Washington, D. C.
MANUFACTURING TECHNOLOGY PROGRAM INFORMATION SYSTEM: FUNCTIONAL DESCRIPTION Final Report
Kenneth J. Wright and Walter P. Hamilton, III Feb. 1983 114 p
(Contract MDA903-81-C-0166)
(AD-A127293; LMI-RE104) Avail: NTIS HC A06/MF A01 CSCL 05/2

This document contains a functional description of the manufacturing technology program information system (MTPIS). This MTPIS will provide OSD and service staff members a tool to strengthen program management's performance in planning, programming, budgeting, execution, documenting benefits and diffusing technology throughout the industrial base. The proposed MTPIS is an automated data processing system to replace most of the existing manual procedures used by OSD and Service staff members. The system will provide automated storage of and access to program-related data. These data will reside in a central computer's data base and will be accessed by the DBMS and related applications software. Author (GRA)

N83-31519# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
A LIFE CYCLE COST MANAGEMENT PRIMER FOR USE WITHIN THE AERONAUTICAL SYSTEMS DIVISION M.S. Thesis
Arnold K. Douville Mar. 1983 218 p refs
(AD-A127267; AFIT-LSSR-80-82) Avail: NTIS HC A10/MF A01 CSCL 05/1

The LCC Management Primer which serves as the basis for this thesis has been developed in response to the recommendation made by the audit team. It has been designed primarily to provide the notice LCC focal point a basis from which to establish a viable LCC Management program. That basis includes general guidance concerning the use of such accepted management tools as goals, trade-off analyses, and management control systems. It also includes a description of the documents use in managing a program and how those documents can precipitate program cost effectiveness through their LCC Management inputs. In addition to the benefits provided to the novice, the Primer should also be of some benefit to more experienced focal points. Specifically, the information provided in the Primer can serve as quick reference material for such key LCC Management elements as cost-related design goals. GRA

N83-31520# Naval Postgraduate School, Monterey, Calif. Dept. of Administrative Sciences.
RESOURCES MANAGEMENT SYSTEM (RMS): AN OVERVIEW M.S. Thesis
Douglas Edward Brandt Dec. 1982 76 p refs
(AD-A127199) Avail: NTIS HC A05/MF A01 CSCL 05/1

This thesis provides a synopia of the resources management system (RMS) which is currently in use at many Navy shore activities. The information is presented in manual format so that it can be used as a guide to the RMS. The manual provides insight into the background of RMS and provides a concise view of RMS operations at the local command level. The manual is focused at the local command level because the greatest number of RMS participants are at that level. The overview highlights relationships within the systems and provides a view of the RMS reporting requirements. Author (GRA)

N83-31521# Desmatics, Inc., State College, Pa.
IDENTIFYING FIXED SUPPORT COSTS IN AIR FORCE VISIBILITY AND MANAGEMENT OF OPERATING AND SUPPORT COSTS (VAMOSC)
Robert L. Gardner and Dennis E. Smith Apr. 1983 24 p refs Presented at the Resource Analysis and Management Working Group (C-2) of the 50th Mil. Operations Res. Soc. Symp., Annapolis, 8-10 Mar. 1983
(Contract F33600-80-C-0554)
(AD-A127403; TR-115-8) Avail: NTIS HC A02/MF A01 CSCL 05/3

This report is essentially a slightly expanded transcript of a presentation given at the 50th Symposium of the Military Operations Research Society (MORs) held at the U. S. Naval Academy, Annapolis, MD, in March 1983. The material represents work in progress under Contract No. F33600-80-C-0554, with the Office of VAMOSC, HQ AFLC/LO, Wright-Patterson AFB, OH. The paper describes an approach for separating installation support costs into fixed and variable components. The findings to date are tentative and are undergoing further investigation.
Author (GRA)

N83-31522# Little (Arthur D.) International, Inc., Wiesbaden (West Germany).
COMPARATIVE STUDY ON PROJECT REVIEW TECHNIQUES Final Report
Santhanam Shekar and Ian S. Walsh Paris ESA 31 Dec. 1982 100 p refs
(Contract ESA-4846/81/NL-PP(SC))
(ADL-87345; ESA-CR(P)-1739) Avail: NTIS HC A05/MF A01

Improvements to ESA's project reviewing methodology, based on a survey of companies which perform project reviews, are proposed. Greater standardization of review terminology, check

lists, and documentation is urged. Increased cooperation with the aerospace industry on project review and management is recommended. Trade-offs should be studied in more detail before board and management decisions are made. Author (ESA)

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N83-31523# Library of Congress, Washington, D. C. Processing Services.
NATIONAL LEVEL AUTHORITY RECORD, PRELIMINARY EDITION
Phyllis A. Bruns Mar. 1982 184 p
(LC-82-600179) Avail: NTIS HC A09/MF A01

Specifications for the data elements that should be included by an organization creating authority records in machine-readable form with the intent of sharing those records with other organizations and/or for contributing them to a nationwide data base are provided. The content of such machine-readable national level records (both variable field data and fixed data fields) is defined. Author

N83-31524# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A DATA BASE SYSTEM FOR ACADEMIS INFORMATION MANAGEMENT [UM SISTEMA DE BANCO DE DADOS PARA CONTROLE ACADEMICO]
Olga Maria deOliveira and Heloisa Galvao V. S. Borges Jun. 1983 14 p refs In PORTUGUESE; ENGLISH summary
(INPE-2776-PRE/345) Avail: NTIS HC A02/MF A01

An efficient system is presented for computer-aided academic management of graduate courses offered at INPE. Data base techniques were used in the design of the system. All data can be viewed by users in table format (a natural viewpoint for the user). The system provides quick access to the desired information. Results are reliable and the data manipulation language is easy to learn. Author

N83-31525# Mitre Corp., Bedford, Mass.
DESIGN GUIDELINES FOR THE USER INTERFACE TO COMPUTER-BASED INFORMATION SYSTEMS
Sidney L. Smith and Arlene F. Aucella Mar. 1983 284 p refs
(Contract F19628-82-C-0001; AF Proj. 522A)
(AD-A127345; ESD-TR-83-122; MTR-8857) Avail: NTIS HC A13/MF A01 CSCL 05/2

The user-system interface (USI) to computer-based information systems can require a sizable investment in software design. In current practice there is still no coherent methodology for design of USI software, but efforts to establish design guidelines are continuing. This report revises and enlarges previous compilations of guidelines, and proposes a total of 580 guidelines for design of USI software in six functional areas: data entry, data display, sequence control, user guidance, data transmission, and data protection. Author (GRA)

N83-31526# Naval Postgraduate School, Monterey, Calif. Dept. of Administrative Sciences.
THE EVOLUTION OF THE INFORMATION SYSTEMS MANAGER M.S. Thesis
Thomas M. Machak Dec. 1982 82 p refs
(AD-A126856) Avail: NTIS HC A05/MF A01 CSCL 05/9

This study examines personality and biographical data gathered from a group of information systems managers in an attempt to determine if these managers are more like their subordinates or their peers. A group of thirty-seven subjects employed in high-level computer-related managerial positions completed a survey designed to measure Murray's Variables of Personality and a biodata questionnaire. The findings were compared to published results from similiar studies conducted on computer programmers and systems analysts and on other managers. The research shows that, in terms of Murray's Variables of Personality, the study group of Information Systems Managers had more in common with other managers than they did with programmers and systems analysts. Additionally, based on the results of a biographical inventory developed to measure a perception of past success and confidence in the future, these men shared a feeling of self-confidence and a positive outlook with other management professional. Author (GRA)

N83-31527# Naval Research Lab., Washington, D. C. Systems Research Branch.
PICTORIAL ENCODING TECHNIQUES FOR A PICTORIAL DATABASE Interim Report
C. C. Yang and S. K. Chang (Illinois Univ.) 13 Apr. 1983 35 p refs
(Contract N00014-82-C-2156; Grant NSF ECS-80-05953; RR014050E; NR Proj. 609-007)
(AD-A126853; NRL-MR-5057) Avail: NTIS HC A03/MF A01 CSCL 09/4

In this report the authors present a methodology of picture encoding for a pictorial database. They first discuss hypercube encoding and the picture covering problem. The hypercube encoding technique generalizes tightly-closed boundary encoding and picture paging techniques. The hierarchical hypercube encoding technique is then introduced. They discuss how micro-pictures can be associated with a hypercube encoding. The picture reconstruction problem can be regarded as materialization of the support picture from a micro-picture. The concepts of picture tree and picture query are then introduced, and we present structured picture retrieval technique. It is illustrated that both generalized zooming and staging techniques can be regarded as special cases of structured picture retrievals. Finally picture information measures for similarity retrieval are presented. Author (GRA)

N83-31528# Corps of Engineers, Chicago, Ill.
THE TOTAL LIBRARY SYSTEM (TLS). VOLUME 3: THE PROCEDURE MANUAL Final Report
W. Richard Schneider 1983 35 p
(AD-A126939; LC-Z678.9-S359) Avail: NTIS HC A03/MF A01 CSCL 09/2

This report is part of a series describing the use of the Boeing EKS1 System in library automation at the library of the U.S. Army. Corps of Engineers. North Central Division Library in Chicago, Illinois. This volume aids a library user in searching titles for books and periodicals. It also provides all the necessary input techniques for the librarian. Author (GRA)

N83-31529# Old Dominion Systems, Inc., Gaithersburg, Md.
DISTRIBUTED INFORMATION DELIVERY SYSTEM. OVERVIEW AND SOURCE LISTINGS OF LOADER AND DELIVERY PROGRAMS, VERSION 1.0
Jeffrey Fischer and Dennis Benson Nov. 1982 191 p refs Prepared in cooperation with National Library of Medicine, Bethesda, Md.
(Contract N01-LM-8-4735)
(PB83-148791; LHNCBC-TR-82-25) Avail: NTIS HC A09/MF A01 CSCL 06E

A prototype, microprocessor based stand alone information delivery system to evaluate the feasibility of using a microcomputer system for retrieval from full text encyclopedia data bases was developed. This experimental system is programmed in PASCAL and is restricted to data base delivery. The overview and source listings manual is one of five manuals and contains a brief description of the design objectives and the implementation approach of the system. The source code for the loader and the delivery program is documented with annotations for nearly every line of code, comprehensive descriptions of the function of each module in the program and its calling sequence. The level of documentation in the source code should be sufficient for an

experienced programmer with some knowledge of PASCAL to modify and adapt the programs or specific configurations or for different data bases. GRA

N83-31530# National Library of Medicine, Bethesda, Md.
LIST OF SERIALS INDEXED FOR ONLINE USERS, 1983
1983 158 p refs
(PB83-180851; NLM-MED-83-01) Avail: NTIS HC A08/MF A01 CSCL 05B

The list is designed to provide complete bibliographic information on serials and Congress proceedings cited in three MEDLARS files: MEDLINE (including the backfiles), Health Planning and Administration, and POPLINE. GRA

N83-31531# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
USE OF SCIENTIFIC AND TECHNICAL INFORMATION IN THE NATO COUNTRIES
Mar. 1983 131 p refs In ENGLISH; partly in FRENCH Meeting held at Rome, 29-30 Sep. 1982
(AGARD-CP-337; ISBN-92-835-0325-2) Avail: NTIS HC A07/MF A01

Organizational structure and operation of defense/aerospace information centers, typical services, and a coordinated information structure are discussed. For individual titles, see N83-31532 through N83-31543.

N83-31532# Dokumentationszentrum der Bundeswehr, Bonn (West Germany).
ORGANIZATIONAL STRUCTURE AND OPERATION OF DEFENCE AND AEROSPACE INFORMATION CENTERS IN THE FEDERAL REPUBLIC OF GERMANY
H.L Braun and G. Tittlebach (Fachinformationszentrum Energie Physik Mathematik G.m.b.H., Eggenstein-Leopoldshafen, West Germany) *In* AGARD Use of Sci. and Tech. Inform. in the NATO Countries Mar. 1983 9 p (For primary document see N83-31531 19-82)
Avail: NTIS HC A02/MF A01

The objectives, tasks, users and services of both information centers are described in detail. The spectrum of information services covers the production of machine-readable databases, magnetic tape services, the publication of printed information services, online services, individual information services, like retrospective search and SDIs, and literature supply. Present development, efficiency, operational methods and techniques are discussed as well as the organizational structures, budgets, future trends and matters of cooperation. Author

N83-31533# Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, The Hague (Netherlands).
ROYAL NETHERLANDS ARMED FORCES SCIENTIFIC AND TECHNICAL DOCUMENTATION- AND INFORMATION-CENTER (TDCK)
E. Gruetzmacher *In* AGARD Use of Sci. and Tech. Inform. in the NATO Countries Mar. 1983 17 p refs (For primary document see N83-31531 19-82)
Avail: NTIS HC A02/MF A01

The history; organization, tasks and authorizations; service rendering; user's circle and informations-sources; and recent internal developments of the Netherlands Armed Forces Scientific and Technical Documentation and Information Center (TDCK) are summarized. Author

N83-31534# Centro di Dokumentazione Tecnico-Scientifica della Difesa, Rome (Italy).
THE ITALIAN DEFENCE SCIENTIFIC AND TECHNICAL DOCUMENTATION CENTRE
Guido Morelli *In* AGARD Use of Sci. and Tech. Inform. in the NATO Countries Mar. 1983 4 p (For primary document see N83-31531 19-82)
Avail: NTIS HC A02/MF A01

The history of the Italian Defence Technical Scientific Documentation Center, its structure, sectorial organization, staff consistency and qualification, administration; its dependence, authority and tasks; structural and operational inconveniences; and present services. Author

N83-31535*# National Aeronautics and Space Administration, Washington, D. C.
ORGANIZATIONAL STRUCTURE AND OPERATION OF DEFENSE/AEROSPACE INFORMATION CENTERS IN THE UNITED STATES OF AMERICA
Hubert E. Sauter (Defense Technical Information Center, Alexandria, Va.) and Louis N. Lushina *In* AGARD Use of Sci. and Tech. Inform. in the NATO Countries Mar. 1983 23 p refs (For primary document see N83-31531 19-82)
Avail: NTIS HC A02/MF A01 CSCL 05B

U.S. Government aerospace and defense information centers are addressed. DTIC and NASA are described in terms of their history, operational authority, information services provided, user community, sources of information collected, efforts under way to improve services, and external agreements regarding the exchange of documents and/or data bases. Contents show how DTIC and NASA provide aerospace/defense information services in support of U.S. research and development efforts. In a general introduction, the importance of scientific and technical information and the need for information centers to acquire, handle, and disseminate it are stressed. Author

N83-31536# Ministry of Agriculture, Fisheries and Food, London (England).
SCIENTIFIC AND TECHNICAL REPORT SERVICES
Tom Norton *In* AGARD Use of Sci. and Tech. Inform. in the NATO Countries Mar. 1983 6 p refs (For primary document see N83-31531 19-82)
Avail: NTIS HC A02/MF A01

A number of topics associated with scientific and technical report services available from defence/aerospace and other technical information centers is addressed. Abstract journals, announcement services and Selective Dissemination of Information (SDI), microfiche, bibliographies and literature searches are covered. Document supply is treated in greater detail and covers the advantages and disadvantages of online document ordering and electronic document supply projects such as ARTEMIS, ADONIS and APOLLO. Finally, a project to control European grey literature, System for Information on Grey Literature in Europe (SIGLE) is described. Author

N83-31537# Netherlands Bibliographical and Documentary Committee, Amsterdam.
INTERNATIONAL INFORMATION EXCHANGE
J. E. vanDijk, J. H. M. Heijnen, P. J. C. Rosenbrand, and H. F. deVries *In* AGARD Use of Sci. and Tech. Inform. in the NATO Countries Mar. 1983 5 p refs (For primary document see N83-31531 19-82)
Avail: NTIS HC A02/MF A01

Bibliographic data bases in the fields of the physical sciences and technology as well as the publications which are the sources of these data bases are discussed. The importance and size of report literature, some cases of international cooperation in establishing bibliographic data bases, and the disclosure of report literature are considered. A model for international cooperation is discussed in relation to the necessity of making arrangements at a governmental level. Duplication of input should be avoided. It is even questioned whether databases sponsored by international organizations or by national governments should continue to cover publications which are easily available, such as books and journal articles, particularly when commercial database producers already cover these publications. Where financial constraints exist, reports and patents might have higher priority. A.R.H.

N83-31538# Environmental Research Inst. of Michigan, Ann Arbor. Infrared Information and Analysis Center.
INFORMATION ANALYSIS CENTRES AND SERVICES
G. J. Zissis *In* AGARD Use of Sci. and Tech. Inform. in the NATO Countries Mar. 1983 5 p refs (For primary document see

N83-31531 19-82)
Avail: NTIS HC A02/MF A01

Established to act as readily accessible sources of information for specific user communities, information analysis center (IACs) serve as active information disseminators within areas of specific technical disciplines or well-defined functional, technological activities. Each center collects, reviews, analyzes, appraises, summarizes, stores, reformats and disseminates technical information related to the disciplinary or functional areas. The history of the IAC programs is reviewed. Examples of those which are discipline centered and those which focus on a bounded area of functional application of technology reveal contributions made by the IACs to the R&D programs, problems encountered, a variety of methodologies tried out by IACs to address these problems, and some lessons learned which can provide insight and guidance to future IAC activities. Author

N83-31539# Consiglio Nazionale delle Ricerche, Rome (Italy). Ist. di Studi sulla Ricerca e Documentazione Scientifica.
ON LINE INFORMATION: THE ITALIAN SITUATION
T. M. Lazzari *In* AGARD Use of Sci. and Tech. Inform. in the NATO Countries Mar. 1983 5 p (For primary document see N83-31531 19-82)
Avail: NTIS HC A02/MF A01

Negative conditions for the development of information systems in Italy and the slow evolution of the European market for the information industry (and the establishment of data bases) are reviewed. The requirements of Italian users could be partially met by English, French, German, and Swedish documentation centers. Participation in the International Nuclear Information System and the FAO agricultural Information System fostered some interest in establishing information service systems in Italy. The transfer of ESA's Information Retrieval Service to Frascati brought the first on-line information system to Italian soil. Since 1973, large and important data bases were implemented in the juridical, legislative, and commercial sectors of the country. The impact of on-line information on economic life is being felt and interest among responsible State officials is noticeably spreading. A.R.H.

N83-31540# National Research Council of Canada, Ottawa (Ontario). Technical Information Service.
BENEFITS TO INDUSTRY (OF COORDINATED DEFENCE/ AEROSPACE INFORMATION STRUCTURE)
Jack Chander and G. Kirouac *In* AGARD Use of Sci. and Tech. Inform. in the NATO Countries Mar. 1983 7 p (For primary document see N83-31531 19-82)
Avail: NTIS HC A02/MF A01

The need for and the sources of information for the defence aerospace industry are considered. Some of the problems that the industry faces are addressed and some of the services available in Canada are described. The issue of possible modifications to the present information system is raised in an attempt to find solutions to the perceived information problems. Author

N83-31541# Centre de Documentation de l'Armement, Paris (France).
ADVANTAGES GAINED BY THE GOVERNMENT FROM A COORDINATION OF DEFENSE-AEROSPACE INFORMATION
C. Paoli *In* AGARD Use of Sci. and Tech. Inform. in the NATO Countries Mar. 1983 8 p refs (For primary document see N83-31531 19-82)
Avail: NTIS HC A02/MF A01

The benefits derived by government authorities from the coordination of information in the sectors of defense and aerospace are described through the organization of the French Armament Documentation Center (CEDOCAR) as regards bibliographic and factual information, the Research Design and Engineering Directorate (DRET), and its Contractors as regards information relating to research programs. Data flows and transfers within the structures of these agencies are analyzed. Author

N83-31542# Trondheim Univ. (Norway). Library.
BENEFITS TO UNIVERSITIES OF A COORDINATED INFORMATION STRUCTURE
Randi A. Gjersvik *In* AGARD Use of Sci. and Tech. Inform. in the NATO Countries Mar. 1983 4 p refs (For primary document see N83-31531 19-82)
Avail: NTIS HC A02/MF A01

The university's role as a user and producer of documented knowledge is outlined. Literature retrieval is necessary in study and research, and the importance of education in the literature searching techniques is emphasized. The role of the university library and its resources in the information structure is discussed. The benefits to the students and the academic staff of an effective and simple information retrieval structure is stressed. Author

N83-31543# Ministry of National Defence, Brussels (Belgium).
COMPARISON OF NETWORKS FOR DOCUMENT ACCESS [COMPARAISON DE RESEAUX D'ACCES AU DOCUMENT: LES SCHEMAS DECENTRALISE, SEMI-CENTRALISE ET CENTRALISE]
Jean-Fr. Muller *In* AGARD Use of Sci. and Tech. Inform. in the NATO Countries Mar. 1983 9 p refs In FRENCH (For primary document see N83-31531 19-82)
Avail: NTIS HC A02/MF A01

A case study of the cost of books and periodicals as well as of regular library activities associated with the acquisition, preservation and dissemination of documents, is used to show the necessity not only of automating libraries, but also of establishing a laison between them. This network can be decentralized, semicentralized, or centralized. The characteristics of these networks for document access are analyzed to establish the balance of their respective advantages and disadvantages. Transl. by A.R.H.

N83-30698*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DEVELOPMENT OF A VIBROACOUSTIC DATA BASE MANAGEMENT AND PREDICTION SYSTEM FOR PAYLOADS
Frank J. On and William Hendricks (Lockheed Missiles and Space Co.) *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 53-64 refs (For primary document see N83-30692 19-31)
(Contract NAS5-25156)
Avail: NTIS HC A09/MF A01 CSCL 05B

N83-30699*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AUTOMATION OF VIBROACOUSTIC DATA BANK FOR RANDOM VIBRATION CRITERIA DEVELOPMENT
Robin C. Ferebee *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 2 May 1982 p 65-70 refs (For primary document see N83-30692 19-31)
Avail: NTIS HC A09/MF A01 CSCL 05B

N83-30884# Hulburt (E. O.) Center for Space Research, Washington, D.C. Ionospheric Effects Branch.
THE DEVELOPMENT OF AN IONOSPHERIC MODEL THESAURUS AND USER'S GUIDE
John M. Goodman *In* AGARD Propagation Aspects of Frequency Sharing, Interference and System Diversity Mar. 1983 12 p refs (For primary document see N83-30873 19-32)
Avail: NTIS HC A18/MF A01

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N83-31544# Committee of Conference (U. S. Congress).
MAKING APPROPRIATIONS FOR THE DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT AND FOR SUNDRY INDEPENDENT AGENCIES, BOARDS, COMMISSIONS, CORPORATIONS, AND OFFICES
Washington GPO 1983 19 p Rept. to accompany H.R. 3133 presented by Comm. of Conf., 98th Congr., 1st Sess., 23 Jun. 1983
(H-Rept-98-264; GPO-11-006) Avail: US Capitol, House Document Room

The joint statement of the Committee of Conference to the House and Senate in explanation of the effect of the action agreed upon by the managers is presented. Recommendations are advanced for appropriations to the Department of Housing and Urban Development, the American Battle Monuments Commission, the Consumer Product Safety Commission, the Environmental Protection Agency, the Federal Emergency Management Agency, the General Service Administration, NASA, the National Science Foundation, the Neighborhood Reinvestment Corporation, the Selective Service System, the Department of the Treasury, the Veterans Administration, the Federal Home Land Bank Board, and general provisions under Title 4. For individual titles, see N83-31545 through N83-31545.

N83-31545# Committee of Conference (U. S. Congress).
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
In its Making Appropriations for the Dept. of Housing and Urban Devel. and for Sundry Independent Agencies, Boards, Comm., Corp., and Offices 1983 p 13-15 (For primary document see N83-31544 19-84)
Avail: US Capitol, House Document Room

Motions recommended to resolve technical disagreement over Senate amendments to the House Bill appropriations for necessary expenses not otherwise provided for in funding for NASA are presented. The projects involved include the space transportation system; a space station; numerical aerodynamic simulation; space communications operations and maintenance; the tracking and data relay satellite system; space telescope; advanced turboprop aircraft; composite materials; laminar flow control; materials processing; solid state observations; technology utilization; and research and analysis in physics, astronomy, and planetology. A.R.H.

N83-31546# Committee on Science and Technology (U. S. House).
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT, 1983
Washington GPO 1983 6 p H.R. 2065 enacted into law by the 98th Congr., 15 Jul. 1983
(GPO-11-139; Pub-Law-98-52) Avail: US Capitol, House Document Room

Appropriations to NASA for research and development, facilities construction, and program management are provided.
Author

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N83-31547*# Research Triangle Inst., Research Triangle Park, N.C.
APPLICATIONS OF AEROSPACE TECHNOLOGY IN BIOLOGY AND MEDICINE
H. C. Beall, J. N. Brown, D. J. Rouse, J. C. Ruddle, and R. W. Scearce Feb. 1978 113 p refs
(Contract NAS1-14708)
(NASA-CR-145338; NAS 1.26:145338) Avail: NTIS HC A06/MF A01 CSCL 05A

A bipolar, donor-recipient model of medical technology transfer is introduced to provide a basis for the team's methodology. That methodology is designed (1) to identify medical problems and NASA technology that in combination constitute opportunities for successful medical products, (2) to obtain the early participation of industry in the transfer proces, and (3) to obtain acceptance by the medical community of new medical products based on NASA technology. Two commercial technology transfers and five institutional technology transfers were completed in 1977. A new, commercially available teaching manikin system uses NASA-developed concepts and techniques for effective visual presentation of information and data. Drugs shipped by the National Cancer Institute to locations throughout the world are maintained at low temperatures in shipping containers that incorporate recommendations made by NASA. Author

N83-31548# California Univ., Livermore. Lawrence Livermore Lab. Transportation Systems Research Dept.
CAN FIBER-COMPOSITE FLYWHEELS INCREASE AUTOMOBILE FUEL ECONOMY
Lawrence G. OConnell Dec. 1982 16 p refs Presented at the 28th Natl. Soc. for the Advancement of Mater. Process Engr. Symp., Anaheim, Calif., 12-14 Apr. 1983
(Contract W-7405-eng-48)
(DE83-005336; UCRL-88107; CONF-830408-2) Avail: NTIS HC A02/MF A01

Overall petroleum consumption in the US has decreased, but not in the transportation sector. In 1981, transportation's use of petroleum increased. If we are to stop this trend without curtailing the vehicle miles traveled (VMT), automobiles must get smaller or the fuel economy of the current sizes must increase. Flywheels have long been considered as a means of improving fuel economy. Flywheels utilized with the internal combustion engine (ICE) allow the engine to be load-leveled. Thus the engine can operate in the region of minimum brake specific fuel consumption or maximum fuel economy. In addition, the flywheel can be used to recover the vehicle's kinetic energy during deceleration and braking operations for later use during acceleration. This adds further to the vehicle's fuel economy. There are two general approaches to the use of the flywheel. In one case, the flywheel power boosts the ICE-supplies power transients, and in the other case, the flywheel drives the wheels and is recharged by the ICE periodically at a constant rate. DOE

N83-30731# Martin Marietta Corp., Denver, Colo.
PERFORMANCE ANALYSIS OF HIGH-SPEED HYDRAULIC SUSPENSION SYSTEMS IN MULTIPLE WHEELED LAND TRANSPORTERS
Phineas Woods *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 52. Part 4 May 1982 p 73-85 refs (For primary document see N83-30722 19-31)
Avail: NTIS HC A08/MF A01 CSCL 13/6

N83-30783# Technische Universitaet, Munich (West Germany).
CONTRIBUTIONS TO THE DYNAMIC ANALYSIS OF MAGLEV VEHICLES ON ELEVATED GUIDEWAYS
K. Popp *In* Shock and Vibration Bulletin, no. 50, part 3 Sep. 1980 p 39-62 refs (For primary document see N83-30778 19-31)
Avail: NTIS HC A10/MF A01 CSCL 13F

88 SPACE SCIENCES (GENERAL)

No abstracts in this category.

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N83-31549*# Perkin-Elmer Corp., Danbury, Conn. Electro-Optical Div.
LDR SEGMENTED MIRROR TECHNOLOGY ASSESSMENT STUDY Final Report
M. Krim and J. Russo 3 Mar. 1983 334 p
(Contract NAS2-11104)
(NASA-CR-166493; NAS 1.26:166493) Avail: NTIS HC A15/MF A01 CSCL 03A

In the mid-1990s, NASA plans to orbit a giant telescope, whose aperture may be as great as 30 meters, for infrared and submillimeter astronomy. Its primary mirror will be deployed or assembled in orbit from a mosaic of possibly hundreds of mirror segments. Each segment must be shaped to precise curvature tolerances so that diffraction-limited performance will be achieved at 30 micron (nominal operating wavelength). All panels must lie within 1 micron on a theoretical surface described by the optical precipitation of the telescope's primary mirror. To attain diffraction-limited performance, the issues of alignment and/or position sensing, position control of micron tolerances, and structural, thermal, and mechanical considerations for stowing, deploying, and erecting the reflector must be resolved. Radius of curvature precision influences panel size, shape, material, and type of construction. Two superior material choices emerged: fused quartz (sufficiently homogeneous with respect to thermal expansivity to permit a thin shell substrate to be drape molded between graphite dies to a precise enough off-axis asphere for optical finishing on the as-received a segment) and a Pyrex or Duran (less expensive than quartz and formable at lower temperatures). The optimal reflector panel size is between 1-1/2 and 2 meters. Making one, two-meter mirror every two weeks requires new approaches to manufacturing off-axis parabolic or aspheric segments (drape molding on precision dies and subsequent finishing on a non-rotationally symmetric dependent machine). Proof-of-concept developmental programs were identified to prove the feasibility of the materials and manufacturing ideas. Author

N83-31550*# National Aeronautics and Space Administration, Washington, D. C.
CARBON LINES AT LIMITEDLY LOW FREQUENCIES
I. Ye. Valtts May 1983 44 p refs Transl. into ENGLISH of "Uglerodnyye Linii na Predelno Nizkikh Chastotakh" rept. Pr-758 Inst. of Space Research, Academy of Sciences (USSR), Moscow, 1983 p 1-56 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-77213; NAS 1.15:77213; Pr-758) Avail: NTIS HC A03/MF A01 CSCL 03A

Detection of several absorption recombination radio lines of carbon at 26 MHz in Cas A direction resulted in an attempt to select similar situations (a gas cloud projection on the intense source of the nonthermal radio emission) that are promising for detecting lines of such a kind. Recommendations are given for observations to be made. Author

N83-31551# Air Force Geophysics Lab., Hanscom AFB, Mass.
USING SMALL APERTURE INTERFEROMETRY TO DETECT PLANETS IN NEARBY BINARY STAR SYSTEMS
Douglas G. Currie, Harold A. McAlister, Timothy J. Schneeberger, and Simon P. Worden 6 Apr. 1983 53 p
(AF Proj. 2311)
(AD-A126962; AFGL-TR-83-0087) Avail: NTIS HC A04/MF A01 CSCL 03/1

If suitably accurate binary star orbits can be observed, the effects of planets in the binary star system may be detectable in the reflex motion of the component binary stars. We show that interferometric measurements of binary star systems will provide this information. We discuss the effects of the atmosphere on degrading images and how interferometry will remove these effects to provide very accurate binary star positions relative to the other components in the binary system. Two systems, amplitude interferometry and speckle interferometry, can accomplish this using existing telescopes and techniques. With these methods, nearly accuracies of 0.00002 arc second are possible for binaries of 1 arc second separation and 10000 arc second for a 5 arc binary. These accuracies are more than enough to detect planets in orbits like Jupiter's out to over 20 pc. There are 188 observable systems within 20 pc, in most of which it is possible to have stable planetary orbits similar to solar system orbits. With advanced data recording systems it is possible to observe binary systems where the components are as faint as +16 stellar magnitudes. A dedicated 2-meter interferometric telescope to monitor binary stars could be built for about 1.4 million dollars. Author (GRA)

N83-31552# Smithsonian Astrophysical Observatory, Cambridge, Mass.
APPLICATION OF TWO-DIMENSIONAL IMAGING TO VERY-HIGH-ENERGY GAMMA-RAY ASTRONOMY, 1 MAY 1983 - 30 APRIL 1984
T. C. Weeks Feb. 1983 40 p refs
(Contract DE-AC02-82ER-40063)
(DE83-009585) Avail: NTIS HC A03/MF A01

Progress on the development of the fast large aperture camera on the 10m reflector on Mt. Hopkins at Whipple Observatory is reported. Preliminary observations with the 19 element camera show that the camera behaves as predicted. It is proposed to expand the camera to 37 elements and to recoat the mirrors of the 10m reflector. An additional 3m reflector will be added to the system to improve its angular discrimination. The camera will be used in the winter of 1983-1984 in an extensive series of observations of candidate gamma ray sources. DOE

N83-30453# Joint Publications Research Service, Arlington, Va.
X-RAY ASTRONOMY RESEARCH ON SALYUT-7
B. Konovalov *In its* USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 21-22 Transl. into ENGLISH from Izv. (Moscow), 24 Jul. 1982 p 2 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N83-31553* Academy of Sciences (USSR), Moscow. Inst. of Space Research.
LARGE SCALE INTERSTELLAR GAS MOVEMENT IN SPIRAL GALAXIES. THERMAL BALANCE AND GAS SELF-GRAVITATION EFFECT
V. G. Berman, L. S.L Marochnik, Yu. N. Mishurov, and A. A. Suchkov 1982 48 p refs In RUSSIAN
(Pr-717) Copyright. Avail: Issuing Activity

Atomic and molecular hydrogen in interstellar gas in dense spiral wave is considered. The gas current is calculated by its self-gravitation and a thermal processor. Transl. by N.W.

N83-31554 Academy of Sciences (USSR), Moscow.
ANOMALOUS RESISTIVITY AND DOUBLE LAYERS IN THE MAGNETOSPHERIC PLASMA
V. A. Liperovsky and M. I. Pudovkin 1983 185 p refs
Copyright. Avail: Issuing Activity

Comparison of the characteristics of the real plasma in space with those supposed by ideal magnetic hydrodynamics show significant disagreement which happens mainly because of collective collision, anomalous resistivity and field-aligned electric fields associated with field-aligned currents of sufficient intensity. In a number of cases existence of double electrostatic layers leads to the same results as a development of collective collisions. Conditions at which both phenomena take place are determined by the threshold intensity of the field-aligned currents. Effects of the wave turbulence, of collective collisions and of double layers are known to play decisive roles in a number of major magnetospheric processes like charged particles acceleration and plasma anomalous diffusion across geomagnetic field lines. Behavior of precipitated particle beams and generation of kilometric-emission are also determined with those effects. Results of theoretical research in the physics of collective collisions and of double electrostatic layers within the magnetospheric plasma are reviewed as well as experimental data on the magnetic field variations, on precipitated electron spectra and on other phenomena. Author

N83-31555# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

STUDY OF AMMONIA EMISSION IN H2 GALACTIC REGIONS: NGC 6334, ORION E G 328.2-0.5 M.S. Thesis [ESTUDO DAS EMISSAO DE AMONIA ORIGINARIA DAS REGIOES HII GALATICAS; NGC 6334, ORION E G 328.2-0.5]

Jose Williams dos Santos Vilas Boas May 1983 101 p In PORTUGUESE; ENGLISH summary

(INPE-2726-TDL/132) Avail: NTIS HC A06/MF A01

A search for NH3 emission towards galactic HII regions NGC 6334, Orion and G 328.2-0.5 was undertaken. All observations were made at frequencies which correspond to the rotational transitions (J,K) = (1,1), (2,2) and (3,3). The observational parameters (antenna temperature, line width, etc.) were utilized to derive the physiçal parameters of the HII regions such as ammonia column density, molecular hydrogen density, etc. Based on these results we discussed the estimated kinetic temperature of these regions as well as the mass of the molecular cloud viewed by the antenna beam. This work also presents the results of first detection NH3 in the direction of the source G 328.2-0.5. Author

N83-31556# Lincoln Lab., Mass. Inst. of Tech., Lexington. Group 94.

A COMPILATION CATALOG IN THE DIRECTION OF THE GALACTIC CENTER

Laurence G. Taff and Sharon A. Stansfield 18 Jan. 1983 24 p refs

(Contract F19628-80-C-0002; AF Proj. 2688; AF Proj. 2295)

(AD-A126175; ESD-TR-82-161; TR-635) Avail: NTIS HC A02/MF A01 CSCL 03/2

This paper describes the construction of a catalog of positions and proper motions for 130 stars in the direction of the galactic center. All available information for stars within approx. 2 deg of this point has been utilized to produce the best and densest possible reference system. The reference frame of the catalog is that of the Southern Reference Star (SRS) program. The typical star in this catalog has a position and angular velocity based on 16 observations from six source catalogs whose epochs of observation span 77 years. The root mean square positional uncertainty is 0.49 at 1975.0. A total of 13 source catalogs dating back to 1847 have been used. Additional information included central dates for right acension and declination, position and proper motion variances, identification numbers, and apparent magnitudes. Author (GRA)

N83-31557# California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.

MULTIPLE SPACECRAFT OBSERVATIONS OF INTERPLANETARY SHOCKS: CHARACTERISTICS OF THE UPSTREAM ULF TURBULENCE

C. T. Russell, E. J. Smith (JPL), B. T. Tsurutani (JPL), J. T. Gosling (Los Alamos National Lab.), and S. J. Bame (Los Alamos National Lab.) 1982 17 p refs Presented at the 5th Solar Wind Conf., Woodstock, Vt., 1-5 Nov. 1982

(Contract W-7405-eng-36)

(DE83-011145; LA-UR-83-1172; CONF-821159-5) Avail: NTIS HC A02/MF A01

All interplanetary shocks observed by ISEE-3 and either ISEE-1 or ISEE-2 or both in 1978 and 1979 are examined for evidence of upstream waves. In order to characterize the properties of these shocks it is necessary to determine accurate shock normals. We invert an overdetermined set of equations to obtain shock normals, velocities and error estimates for all these shocks. Tests of the method indicate it is quite reliable. Using these normals we then calculate the Mach number and angle between the interplanetary magnetic field and the shock normal for each shock. These parameters allow us to separate the upstream waves into two classes: whistler-mode precursors which occur at low Mach numbers and upstream turbulence whose amplitude at Mach numbers greater than 1.5 is controlled by the angle of the field to the shock normal. The former waves are right-hand circularly polarized and quite monochromatic. The latter waves are more linearly polarized and have a broadband featureless spectrum. DOE

N83-31558# Los Alamos Scientific Lab., N. Mex. School of Physics.

NEUTRINO OSCILLATIONS IN THE EARLY UNIVERSE 2

B. H. J. McKellar and H. Granek (Melbourne Univ., Parkville, Australia) 1982 10 p refs Presented at Neutrino Conf., Telemark, Wis., 23-25 Sep. 1982 Submitted for publication

(Contract W-7405-eng-36)

(DE83-003547; LA-UR-82-3456; CONF-820971-2) Avail: NTIS HC A02/MF A01

It is shown that it is possible for neutrino oscillations to create a state of the universe in which the net lepton numbers are appreciable and different for each species at the time of nucleosynthesis. Under these conditions mixing induced by the oscillations can influence the abundances of the light elements. DOE

N83-31559# Universidad de la Laguna (Spain). Inst. de Astrofisica de Canarias.

INTRODUCTION TO THE THEORY OF STELLAR ATMOSPHERES [INTRODUCCION A LA TEORIA DE LAS ATMOSFERAS ESTELARES]

M. Vazquez 1983 104 p In SPANISH

(Ser-C-1-1983) Avail: NTIS HC A06/MF A01

The fundamental equations of continuity and transport, the Eddington approximation, the excitation, ionization and absorption processes, the formation of spectral lines, and the models of stellar atmospheres are described. Convection in the stellar atmosphere is discussed including the Schwarzschild criterium, the computation of velocity fields, and the characteristics of chromospheres and coronas. Author (ESA)

N83-31560# Universidad de la Laguna (Spain). Inst. de Astrofisica de Canarias.

THE DECAY OF Mg II EMISSION IN MAIN SEQUENCE (MS) STARS

Jose Cabestany, Manuel Vasquez, Remigio Gomez, and Jose D. Ponz (European Southern Observatory, Munich) 1982 9 p refs Presented at IAU Symp. No. 102 on Solar and Stellar Magnetic Fields: Origins and Coronal Effects, Zurich, 2-6 Aug. 1982

Avail: NTIS HC A02/MF A01

Age decay of the 2800 A Mg II doublet in main sequence stars was studied, using IUE and literature data. The nonlinearity of the decay is confirmed. The emission shows a strong decrease until 2 times 10 to the 19th power years. Behavior of older stars is unclear. Author (ESA)

N83-31561# National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.

SOLAR-GEOPHYSICAL DATA NUMBER 460, DECEMBER 1982. PART 1: (PROMPT REPORTS). DATA FOR NOVEMBER 1982, OCTOBER 1982 AND LATE DATA

Helen E. Coffey, ed. Dec. 1982 140 p 2 Vol.
(PB83-170886; SGD-460-Pt-1; NOAA-83022202) Avail: NTIS HC A07/MF A01 CSCL 03B

Measurements of solar phenomena and activities are given. Data is given on alert periods; daily solar indices; solar flares; solar radio emission; inferred interplanetary magnetic field polarities; mean solar magnetic field; daily solar activity centers; sudden ionospheric disturbances; cosmic rays; geomagnetic indices; and radio propagation indices. GRA

N83-31562# National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 460, DECEMBER 1982. PART 2: (COMPREHENSIVE REPORTS). DATA FOR JUNE 1982, JULY 1980 AND MISCELLANEA
Helen E. Coffey, ed. Dec. 1982 161 p 2 Vol.
(PB83-170894; SGD-460-Pt-2; NOAA-83022203) Avail: NTIS HC A08/MF A01 CSCL 03B

Data is given on solar flares, solar radio emissions, and mass ejections from the Sun. GRA

N83-31563# National Academy of Sciences - National Research Council, Washington, D. C. Assembly of Mathematical and Physical Sciences.
STRATEGY FOR SPACE ASTRONOMY AND ASTROPHYSICS FOR THE 1980'S Final Report
1979 113 p
(PB83-174151) Avail: NTIS HC A06/MF A01 CSCL 03B

A scientific strategy for space astronomy and astrophysics for the 1980's was developed. It focuses on the programs, experiments, and instruments that will be required to continue progress, on a broad front toward answering the many important and varied scientific questions that are identified as goals to achieve. GRA

N83-30457# Joint Publications Research Service, Arlington, Va.
UNIFIED THEORY OF MOTION OF INNER PLANETS
V. Kotelnikov and M. Kislik *In its* USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 44-47 Transl. into ENGLISH from Izv. (Moscow), 1 May 1982 p 3 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N83-31564*# Houston Univ., Tex.
ADVANCES IN PLANETARY GEOLOGY
Feb. 1983 355 p refs
(NASA-TM-85630; NAS 1.15:85630) Avail: NTIS HC A16/MF A01 CSCL 03B

Topics discussed include: (1) Martian global tectonics; (2) the origin and evolution of a circular and an irregular lunar mare; (3) stratigraphy of Oceanus Procellarum basalts: sources and styles of emplacement; (4) the tectonic evolution of the Oceanus Procellarum Basin; (5) charting the Southern Seas: the evolution of the Lunar Mare Australe; (6) the stratigraphy of Mare Imbrium; and (7) Storms and rains: a comparison of the Lunar Mare Imbrium and Oceanus Procellarum. A.R.H.

N83-31565# Argonne National Lab., Ill. Chemistry Div.
THE ROLE OF PHOSPHORUS IN LUNAR SAMPLES: A CHEMICAL STUDY
S. Jovanovic and G. W. Reed, Jr. 1982 26 p refs Presented at the 13th Lunar and Planetary Conf., Houston, Tex., 15 Mar. 1982 Submitted for publication
(Contract W-31-109-eng-38)
(DE83-007816; CONF-8203115-1) Avail: NTIS HC A03/MF A01

The roles played by phosphorus present in lunar material may be important in understanding the evolution of the crustal rocks. Quantitative extraction of phosphorus and trace elements associated with possible phosphate phases is the ultimate objective of these studies. Because P may be present in glassy or microcrystalline mesostasis and also as discrete phosphate minerals and as phosphides, chemical procedures provide a tool for its determination along with its complements of trace elements. In these experiments 0.1 M acid was used as a phosphate-specific agent. One experiment was designed to measure how quantitatively P-related constituents are extracted. In consecutive leaching steps more P and REE were dissolved, 76 vs 26% P and 64 vs 37% Sm, from the finer grain sample split. This could be a grain size effect or it could be due to phase separations. Only small amounts of soluble phases remained after the initial 10 minute extraction. Phosphorous and REE are dilute acid soluble in amounts ranging up to 70%. They have sympathetically but are not necessarily highly correlated. DOE

N83-30456# Joint Publications Research Service, Arlington, Va.
TELEVISION ON VENUS
A. S. Selivanov and M. K. Narayeva *In its* USSR Rept.: Space, No. 19 (JPRS-82771) 31 Jan. 1983 p 40-43 Transl. into ENGLISH from Zemlya i Vselennaya (Moscow), no. 4, Jul. - Aug. 1982 p 4-6 (For primary document see N83-30444 19-12)
Avail: NTIS HC A06

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N83-31566*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A COMPARISON OF CORONAL AND INTERPLANETARY CURRENT SHEET INCLINATIONS
K. W. Behannon, L. F. Burlaga, and A. J. Hundhausen Jul. 1983 22 p refs
(NASA-TM-85064; NAS 1.15:85064) Avail: NTIS HC A03/MF A01 CSCL 03B

The HAO white light K-coronameter observations show that the inclination of the heliospheric current sheet at the base of the corona can be both large (nearly vertical with respect to the solar equator) or small during Cararington rotations 1660 - 1666 and even on a single solar rotation. Voyager 1 and 2 magnetic field observations of crossing of the heliospheric current sheet at distances from the Sun of 1.4 and 2.8 AU. Two cases are considered, one in which the corresponding coronameter data indicate a nearly vertical (north-south) current sheet and another in which a nearly horizontal, near equatorial current sheet is indicated. For the crossings of the vertical current sheet, a variance analysis based on hour averages of the magnetic field data gave a minimum variance direction consistent with a steep inclination. The horizontal current sheet was observed by Voyager as a region of mixed polarity and low speeds lasting several days, consistent with multiple crossings of a horizontal but irregular and fluctuating current sheet at 1.4 AU. However, variance analysis of individual current sheet crossings in this interval using 1.92 see averages did not give minimum variance directions consistent with a horizontal current sheet. M.G.

N83-31567# California Univ., Irvine.
DYNAMIC MODELING OF CORONAL TRANSIENTS AND INTERPLANETARY DISTURBANCES Final Technical Report
R. S. Steinolfson Jul. 1982 75 p refs Prepared for Alabama Univ., Huntsville
(Grant NA80RA-D-00012)
(PB83-175950; NOAA-83030101) Avail: NTIS HC A04/MF A01 CSCL 03B

The numerical simulation of the propagation of solar gener-

ated disturbances through the lower corona and the solar wind was investigated. The application of a numerical code to the study of a particular solar related phenomena is described. Two dimensional studies, and a one dimensional code are presented. The numerical solution of the time dependent dissipationless, magnetohydrodynamic equations of motion are studied. GRA

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N83-31568*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

COREQUAKE AND SHOCK HEATING MODEL OF THE 5 MARCH 1979 GAMMA RAY BURST

D. C. Ellison and Demosthenes Kazanas Jun. 1983 38 p refs Submitted for publication

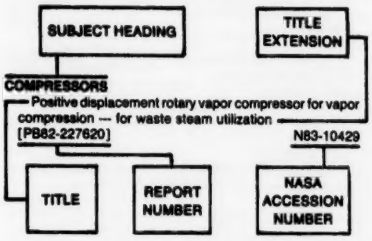
(NASA-TM-85059; NAS 1.15:85059) Avail: NTIS HC A03/MF A01 CSCL 03B

Ramatry, et al. proposed a model to account for the 5 March 1979 gamma ray burst in terms of a neutron star corequake and subsequent shock heating of the neutron star atmosphere. This model is extended by examining the overall energetics and characteristics of these shocks, taking into account the e(+)-e(-) pair production behind the shock. The effects of a dipole magnetic field in the shock jump conditions are also examined and it is concluded that the uneven heating produced by such a field can account for the temperature difference between pole and equator implied by the pulsating phase of the burst. The overall energetics and distribution of energy between e(+)-(-) pairs and photons appears to be in agreement with observations if this event is at a distance of 55 kpc as implied by its association with the Large Magellanic Cloud. M.G.

99 GENERAL

No abstracts in this category.

Typical Subject Index Listing



The subject heading is the key to the subject content of the document. Titles, report numbers, and accession numbers of pertinent documents are provided under each subject heading. When the title is insufficiently descriptive of the document content, a title extension has been added, separated from the title by three hyphens. The report number helps to indicate the type of document cited (e.g., NASA report, NASA translation, NASA contractor report). The NASA accession number is the number by which the document abstracts are arranged in this journal and by which the document is sold or requested. The titles, with title extensions if present, are arranged under each subject heading in ascending accession number order. The subject headings have been selected from the latest revision of the *NASA Thesaurus* (NASA SP-7051).

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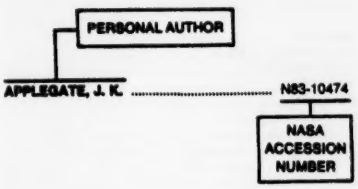

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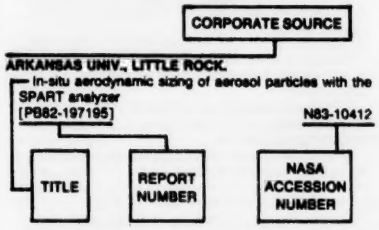

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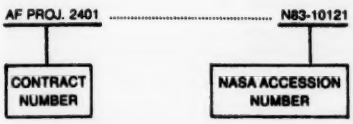

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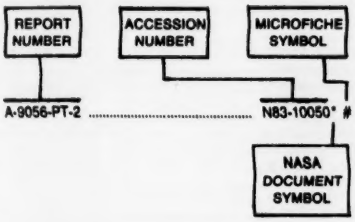

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